ET-AVRProg mini

ET-AVRProg mini is the board that is designed to download HEX File into AVR Microcontroller of ATMEL through PORT ISP. It is compatible with Program AvrProg, AvrOspll, CodeVision, avrdude or other programs that support Protocol AVR910.

Technical Specifications of ET-AVRProg mini

1. Program data through PORT ISP and be able to read, write, erase and protect data from reading
2. Be compatible with Target Board that uses 2.5V-5.5V Power Supply
3. Communicate through PORT USB
4. Has Signal CLOCK to edit Fuse Bits if choosing Fuse Bits of Signal CLOCK wrongly.
5. Has LED to display operating status of USB, STATUS
6. Use standard ISP 10PIN Connector that is compatible with AVR Boards of ETT or other boards that have the standard 10PIN Connector such as ET-AVR STAMP ATMEGA64/128, ET-BASE AVR, ET-Easy168 STAMP and etc. Moreover, there is Connector CONVERT that converts connector from ISP 10PIN Connector into ISP 6PIN Connector, so it is compatible with other AVR Boards.
7. Be compatible with programs that support Protocol AVR910 such as AvrProg, AvrOspll, CodeVision, or avrdude.
8. Support Windows 98, me, 2000, XP, Vista

AVR Numbers that are programmable with Program AvrProg are:

AT90S1200, AT90S2313, AT90S2323, AT90S2333, AT90S2343, AT90S4414, AT90S4433, AT90S4434, AT90S8515, AT90S8535,

ATmega103, ATmega128, ATmega16, ATmega161, ATmega163, ATmega169, ATmega32, ATmega64, ATmega8, ATmega8515, ATmega8535,

ATtiny10, ATtiny12, ATtiny15, ATtiny26

AVR Numbers that are programmable with Program AvrOspll are:

AT90CAN128, AT90CAN32, AT90CAN64, AT90PWM2, AT90PWM216, AT90PWM2B, AT90PWM3, AT90PWM316, AT90PWM3B

AT90S1200, AT90S2313, AT90S2323, AT90S2343, AT90S4414, AT90S4433, AT90S4434, AT90S8515, AT90S8515, AT90S8535,

AT90SUSB1286, AT90SUSB1287, AT90SUSB162, AT90SUSB646, AT90SUSB647, AT90SUSB82,

ATmega103, ATmega128, ATmega1280, ATmega1281, ATmega16, ATmega161, ATmega162, ATmega163, ATmega164P, ATmega165, ATmega165P, ATmega168, ATmega168P, ATmega169, ATmega169P, ATmega16HVA, ATmega2560, ATmega2561, ATmega32, ATmega323, ATmega234P, ATmega235, ATmega3250, ATmega2350P, ATmega325P, ATmega328P, ATmega329, ATmega3290, ATmega3290P, ATmega329P, ATmega406, ATmega48, ATmega48P, ATmega64, ATmega640, ATmega644, ATmega644P, ATmega645, Atmega6450, ATmega649, ATmega6490, ATmega8, ATmega8515, ATmega8535, ATmega88, ATmega88P,

ATtiny11, ATtiny12, ATtiny13, ATtiny15, ATtiny22, ATtiny2313, ATtiny24, ATtiny25, ATtiny26, ATtiny261, ATtiny28, ATtiny43U, ATtiny44, ATtiny45, ATtiny461, ATtiny48, ATtiny84, ATtiny85, ATtiny861

AVR Numbers that are programmable with Program CodeVisionAVR are:

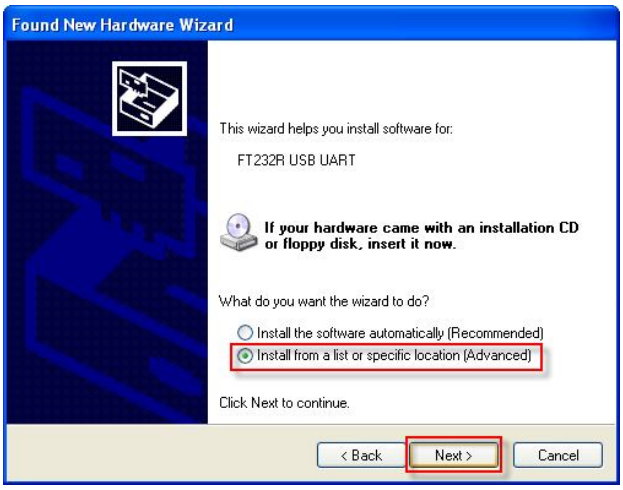
ATtiny13, ATtiny22, ATtiny22L, ATtiny2313, ATtiny2313V, ATtiny24, ATtiny25, ATtiny26, ATtiny26L, ATtiny261, ATtiny261V, ATtiny44, ATtiny45, ATtiny461, ATtiny461V, ATtiny48, ATtiny48V, ATtiny84, ATtiny85, ATtiny861, ATtiny861V, ATtiny88, ATtiny88V,

AT90S2343, AT90LS2343, AT90S4414, AT90S4433, AT90LS4433, AT90S4434, AT90LS4434, AT90S8515, AT90S8535, AT90LS8535,
AT90CAN128, AT90CAN32, AT90CAN64,
AT90PWM2, AT90PWM2B, AT90PWM216, AT90PWM3, AT90PWM3B, AT90PWM316,
AT90USB1286, AT90USB1287, AT90USB162, AT90USB646, AT90USB647, AT90USB82,
ATmega103, ATmega130L, ATmega128, ATmega128L, ATmega1280, ATmega1280V, ATmega1281, ATmega1281V, ATmega1284P, ATmega16, ATmega16L, ATmega161, ATmega161L, ATmega162, ATmega162L, ATmega162U, ATmega162V, ATmega163, ATmega163L, ATmega164, ATmega164V, ATmega164P, ATmega164PV, ATmega165, ATmega165V, ATmega168, ATmega168V, ATmega168P, ATmega168PV, ATmega169, ATmega169L, ATmega2560, ATmega2560V, ATmega2561, ATmega2561V, ATmega32, ATmega32L, ATmega232, ATmega323L, ATmega324, ATmega324V, ATmega324P, ATmega324PV, ATmega325, ATmega325V, ATmega3250, ATmega3250V, ATmega325P, ATmega325PV, ATmega3250P, ATmega3250PV, ATmega328P, ATmega328PV, ATmega329, ATmega329V, ATmega3290, ATmega3290V, ATmega329P, ATmega329PV, ATmega3290P, ATmega3290PV, ATmega48, ATmega48V, ATmega48P, ATmega48PV, ATmega603, ATmega603L, ATmega64, ATmega64L, ATmega640, ATmega640V, ATmega644, ATmega644V, ATmega644P, ATmega644PV, ATmega645, ATmega645V, ATmega6450, ATmega6450V, ATmega649, ATmega649V, ATmega6490, ATmega6490V, ATmega8, ATmega8L, ATmega8515, ATmega8515L, ATmega8535, ATmega8535L, ATmega88, ATmega88V, ATmega88P, ATmega88PV

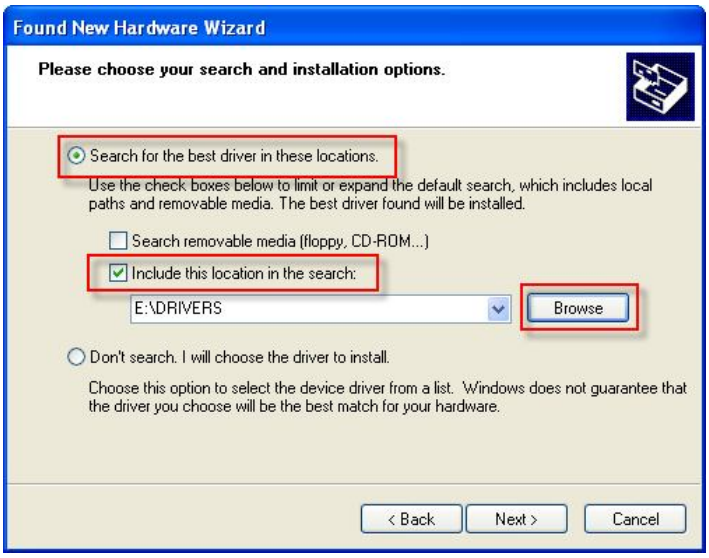
How to install Driver of ET-AVRProg mini

1. Interface **ET-AVRProg mini** with computer through PORT USB without interfacing with any Target Board, and then windows found new Hardware as shown in the picture below.

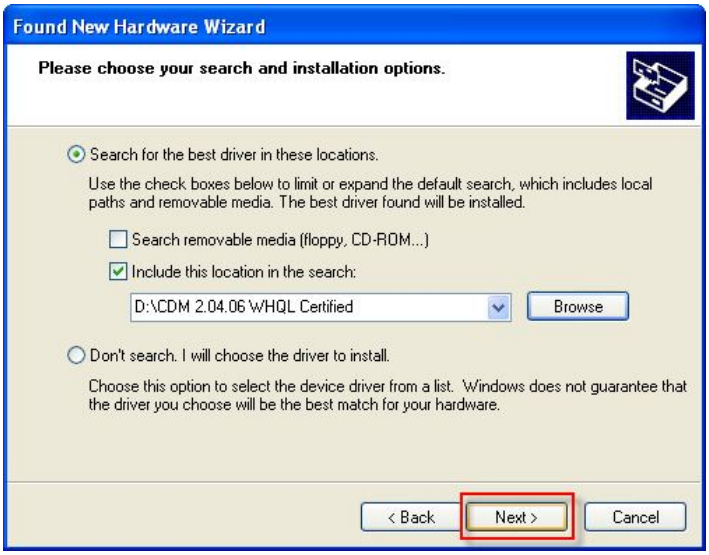
2. It displays window **"Found New Hardware Wizard"**, choose **"Install from a list or specific location (Advanced)"** and then click **Next.**

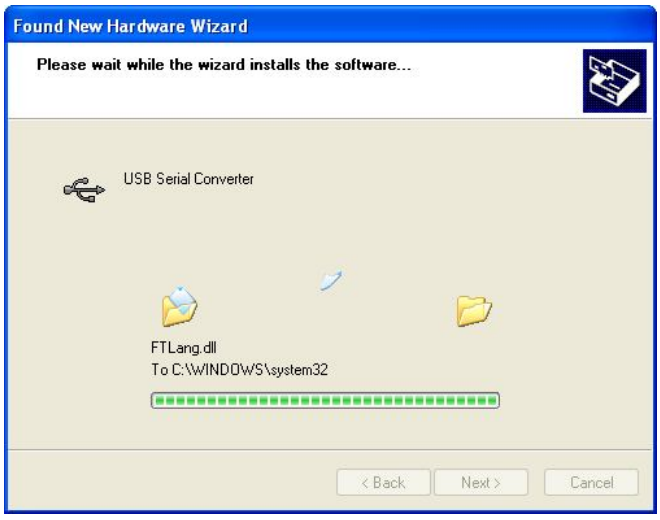

Found New Hardware Wizard
This wizard helps you install software for:
FT232R USB UART
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

3. Choose values as shown in the picture below, click **Browse** to specify location of Driver and then click **OK.**


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
E:\DRIVERS
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

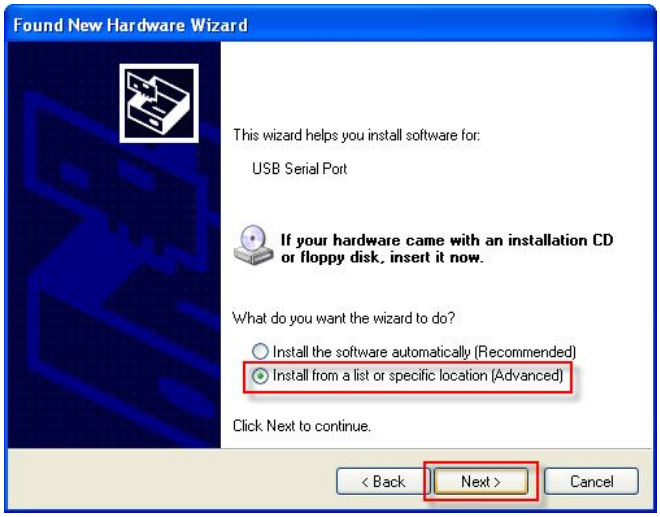
4. Click **Next** when user has already set all values successfully, and then windows searches Hardware to install Driver.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
D:\CDM 2.04.06 WHQL Certified
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

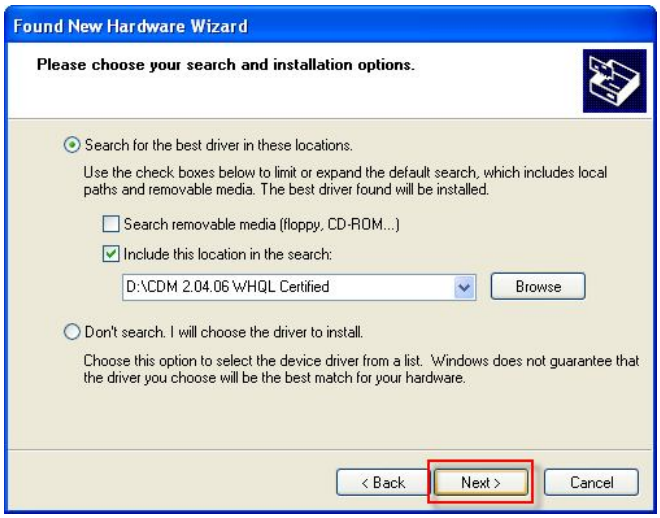


5. Click **Finish** when the window told user that the software has already been installed; in this case, LED that displays operating status of USB is ON, it means that the part of USB starts running.

6. Just a moment, the Driver builds alike Serial Port and there is window to install Driver of USB Serial Port as shown in the picture below; in this case, user should choose the values as same as the values in the previous step and then click **Next**.

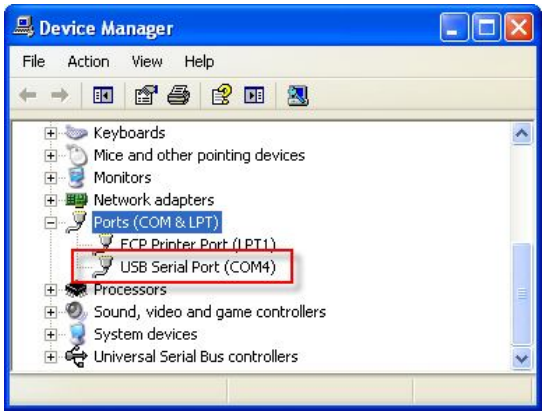

Found New Hardware Wizard
This wizard helps you install software for:
USB Serial Port
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

7. Choose location of Driver; normally, it can remember the old value, so user can click **Next** instantly. Windows searches Hardware to install Driver.

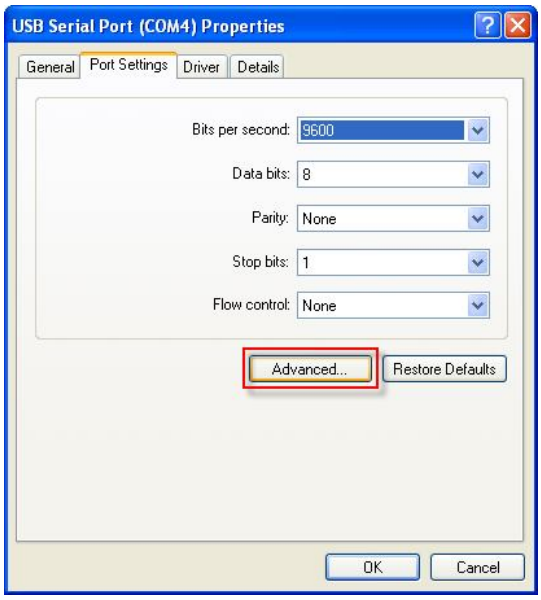

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
D:\CDM 2.04.06 WHQL Certified
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

8. Click **Finish** when window told that it has already installed successfully.

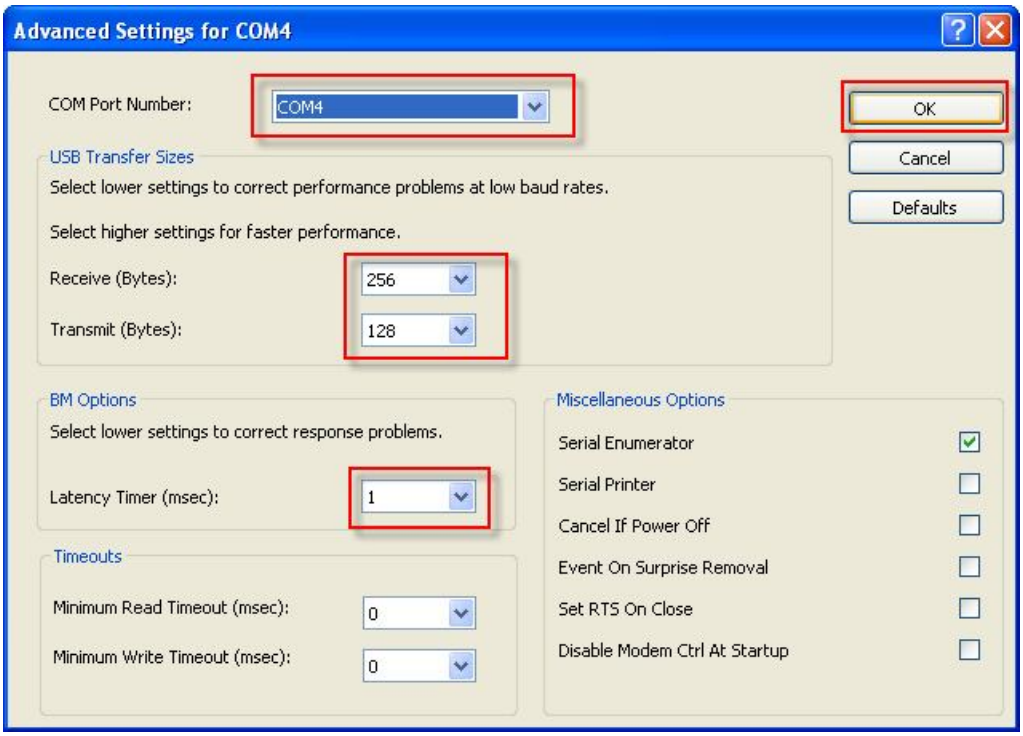
9. User can check the Driver installation of ET-AVRProg mini whether it is complete or not; click Menu "**Control Panel → System**", choose **Tab Hardware** and then choose **Device Manager**; in this case, the item of **Hardware USB Serial Port** is added as shown in the picture below.



10. Double-click **USB Serial Port** in the part of **Ports(COM&LPT)**, it displays windows **Properties** as shown in the picture below; in this case, choose **Port Setting** and then click **Advanced**…

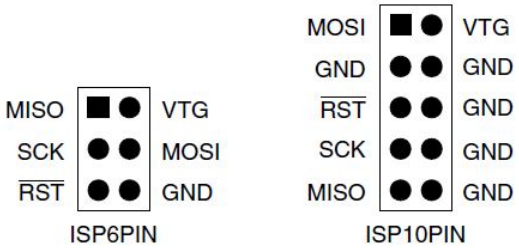


11. Change COM Port Number; **if using Program AvrProg(AVR Studio), it only supports COM1-COM4; on the other hand, if using Program AvrOspll or CodeVision, it is able to set the COM PORT Number more than COM4.** Moreover, it sets **Receive(Bytes)** to be **256**, sets **Transmit(Bytes)** to be **128**, and then sets **Latency Timer (msec)** to be **1** as shown in the picture below. Next, click **OK** to confirm the change and then restart computer or scan new Hardware again.

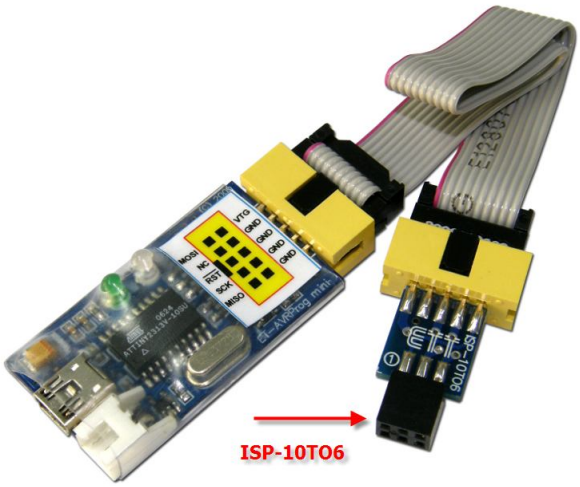

Advanced Settings for COM4
COM Port Number:
COM4
OK
Cancel
Defaults
USB Transfer Sizes
Select lower settings to correct performance problems at low baud rates.
Select higher settings for faster performance.
Receive (Bytes):
256
Transmit (Bytes):
128
BM Options
Select lower settings to correct response problems.
Latency Timer (msec):
1
Timeouts
Minimum Read Timeout (msec):
0
Minimum Write Timeout (msec):
0
Miscellaneous Options
Serial Enumerator
Serial Printer
Cancel If Power Off
Event On Surprise Removal
Set RTS On Close
Disable Modem Ctrl At Startup

How to Connect ET-AVRProg mini with AVR Microcontroller

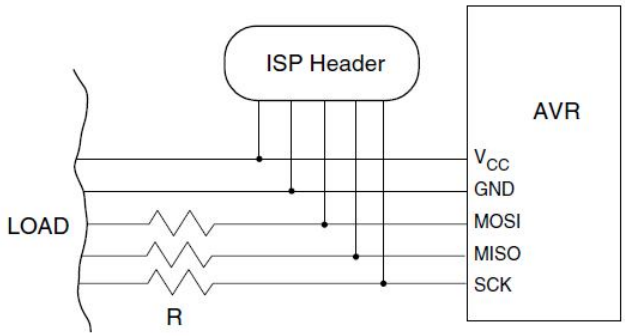
Basically, there are 2 types of ISP Connector to program AVR Microcontroller; ISP 6 PIN and ISP 10 PIN as shown in the picture below. In this case, AVR Microcontroller of ETT uses ISP 10 PIN Connector.



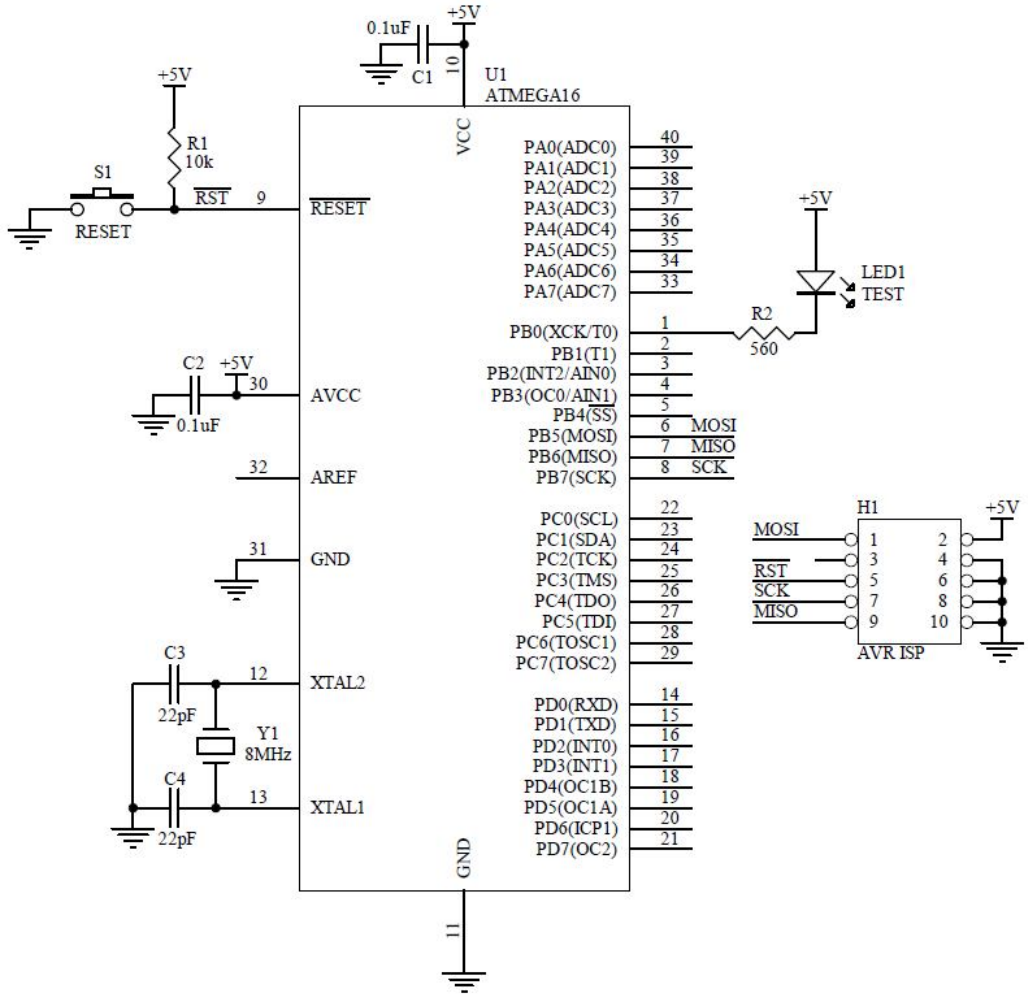
If user has Board that is under standard of ISP 6 PIN, can use it with ET-AVRProg mini instantly; in this case, it is used with **ADAPTER ISP-10TO6** as shown in the picture below.



It uses Cable **MISO**, **MOSI**, **SCK**, **RST**, **VTG**, and **GND** that must be interfaced with Pin ISP Interface of AVR; in this case, there is Power Supply for AVR Microcontroller Board separately, it is unable to use Power Supply from ET-AVRProg mini. If it uses Pin ISP to be Pin PORT, it needs to interface Resistor at least 10 Ohm before using as shown in the picture below. Otherwise, there is error in loading signal for programming.

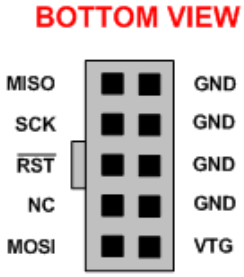


Example Circuit of AVR Microcontroller



From the picture above, it is the example circuit of AVR No.ATMEGA16 that describes the application of ET-AVRProg mini. It uses ISP 10PIN Connector, so user can uses Pair Cable 10PIN to connect signal from ET-

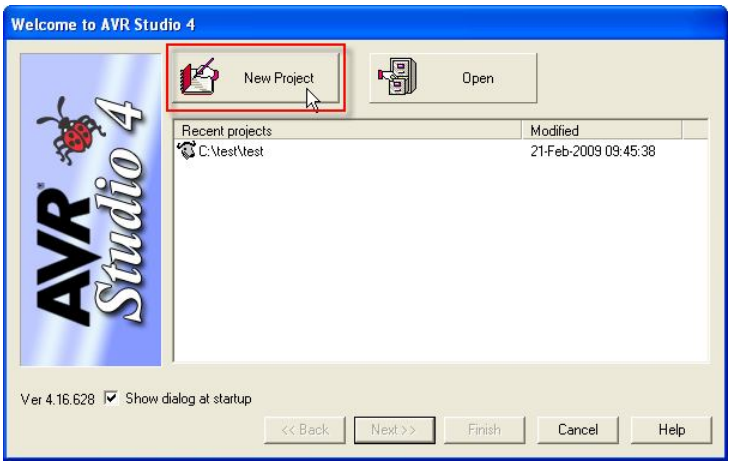
AVRProg mini to **H1 Connector** for programming instantly. The Pin position of Pair Cable 10PIN when see from bottom is displayed as shown below.



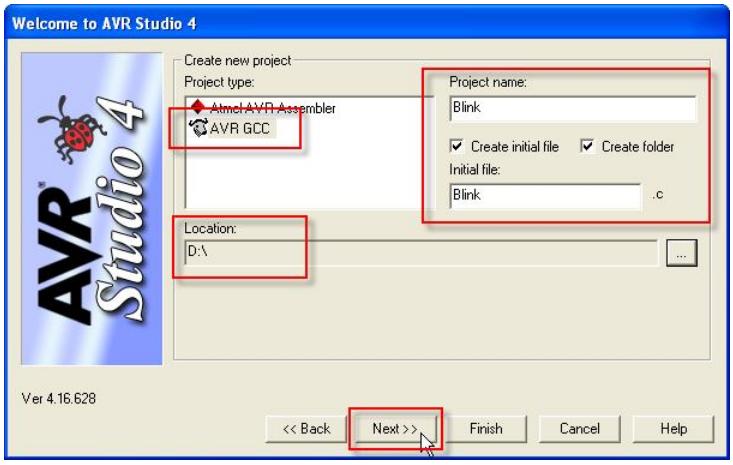
How to use ET-AVRProg mini with Program AvrProg (AVR Studio)

This example uses ET-AVRProg mini with Program AVR Studio 4 +WinAVR that is Assembly Language and C Language Complier. It is free without any charge and no problem of copyright. Program AVR Studio 4 and WinAVR are provided with this CD-ROM User's Manual or user can download Program AVR Studio 4 from website: www.atmel.com and download Program WinAVR from website: http://winavr.sourceforge.net. The procedure to use program is described below;

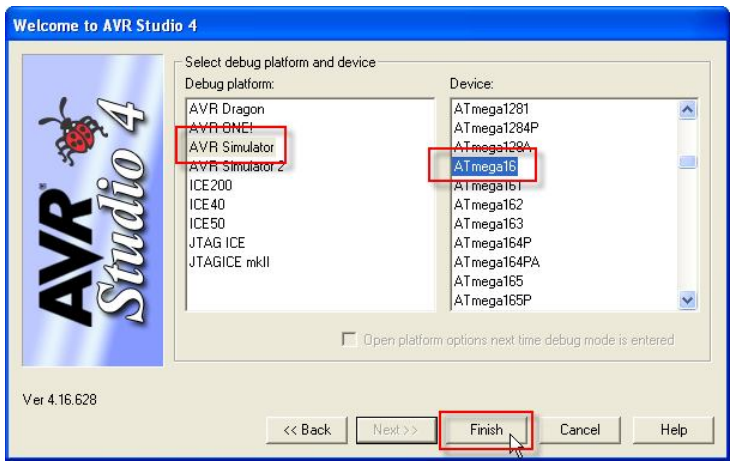
1. Open **Program AVR Studio 4**; it displays window **"Welcome to AVR Studio 4"**, and then choose **New Project** to build new project as shown in the picture below.



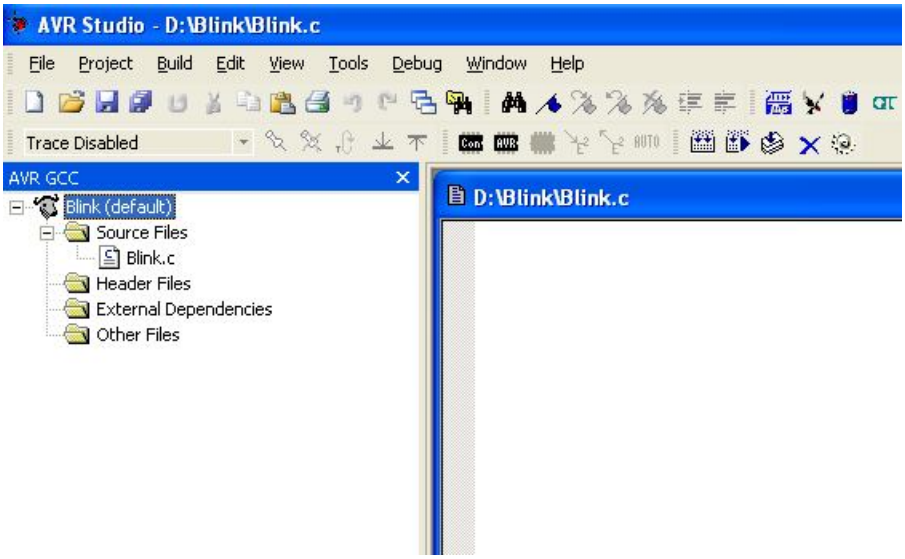
2. Choose **Project Type** to be **AVR GCC** if writing program as C Language; or choose it as **Atmel AVR Assembler** if writing program as Assembly Language. Then specify project name, file name and location to store the project as desired and finally, click **Next>>** as shown in the picture below.



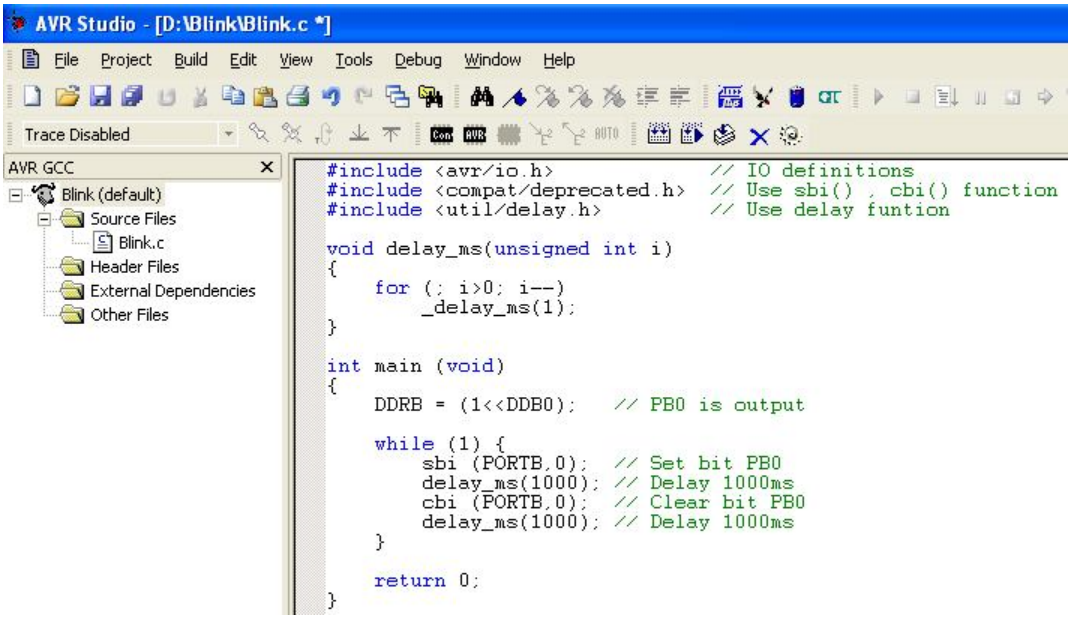
3. Choose **Debug platform** as **AVR Simulator** in the case of imitating operation of the program that is written by software; choose **Device** as **Atmega16** that is the reference number for the application; and finally click **Finish** as shown in the picture below.



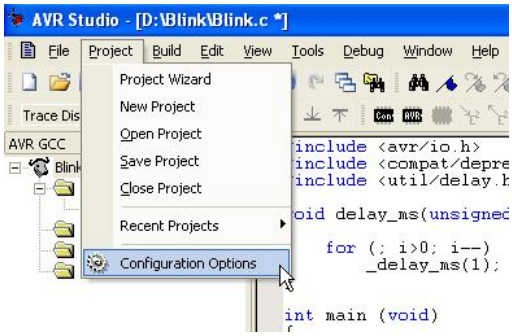
4. It displays blank window for writing program as shown in the picture below.



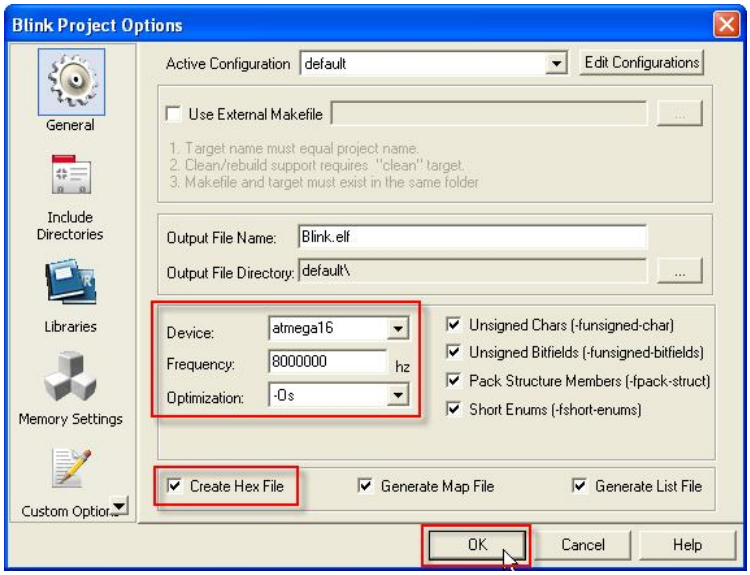
5. Write program by C language as required; in this case, it is the example program of blinking light at PIN PB0 of Atmega16 with 1 second speed as shown in the example below.



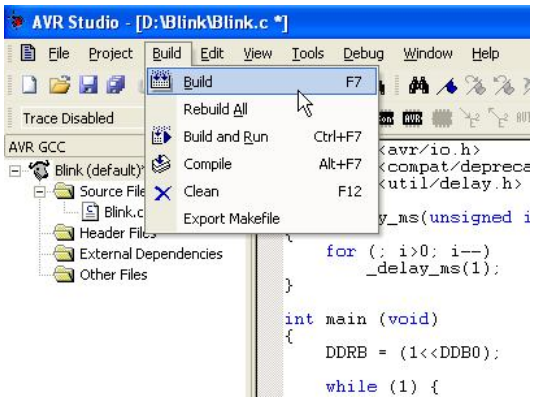
6. After wrote program successfully, click Menu "**Project → Configuration Options**" as shown in the picture below;



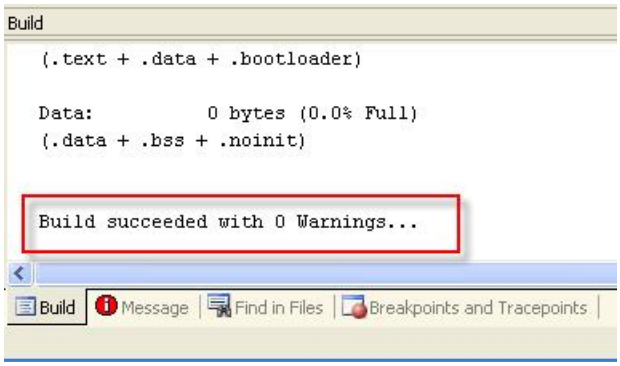
7. It displays window **"Project Options"**; choose **Device** to be **atmega16**, and **Frequency** to be **8000000 hz** as shown in the circuit. Next, choose value in the blank **Create Hex File** and finally click **OK** as shown in the picture below.



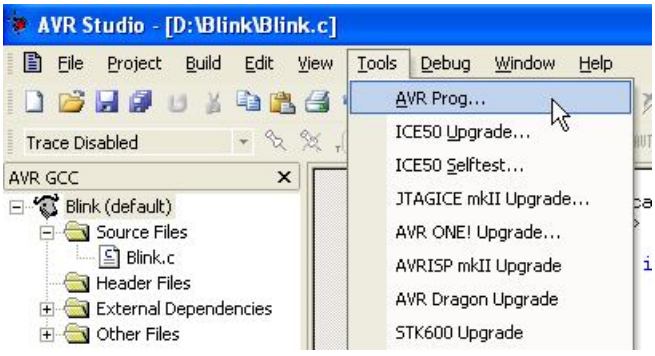
8. When set values completely, click Menu **Build** to compile program as shown in the picture below.



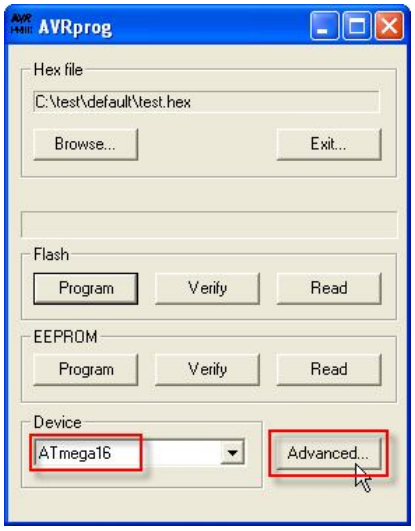
9. If the written program is correct according to the syntax, it displays message **"Build succeeded"** as shown in the picture below. On the other hand, if it is incorrect, it displays error message to warn user to edit and re-build the new one.



10. When everything is OK, next step is downloading HEX File into AVR Microcontroller, click Menu **"Tools → AVR Prog"** as shown in the picture below.

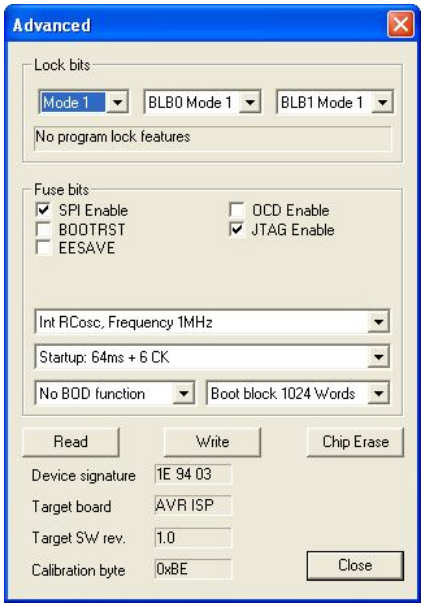


11. It displays window of **Program AVRProg**, set **Device** to be **Atmega16** and then click **Advanced** as shown in the picture below.



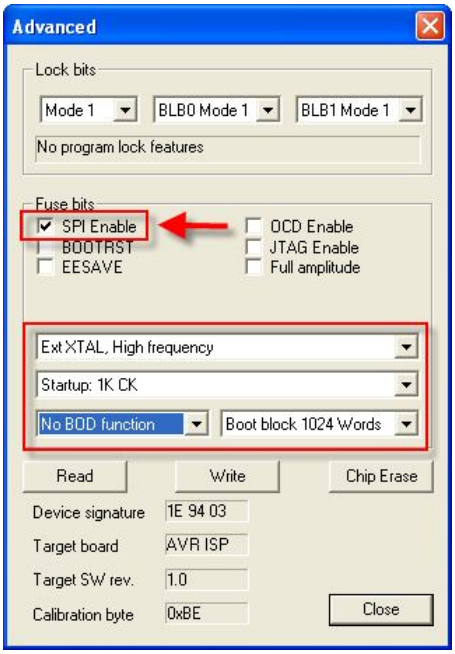
12. If program is unable to connect with ET-AVRProg mini, it displays message as shown in the picture below, so user needs to check the connection between ET-AVRProg mini and computer again. The main cause may be occurred because of installing Driver incompletely; in this case, user can see LED that displays the operating status of ET-AVRProg mini to check whether it is ON or OFF. If it is ON, it is correct; on the other hand, if it is OFF, it has problem. Moreover, it maybe occurred because of choosing the COM Port Number incorrect, not in the range of COM1-COM4; in this case, Program Avrprog only supports COM1-COM4.

13. It displays window **Advanced** as shown in the picture below.



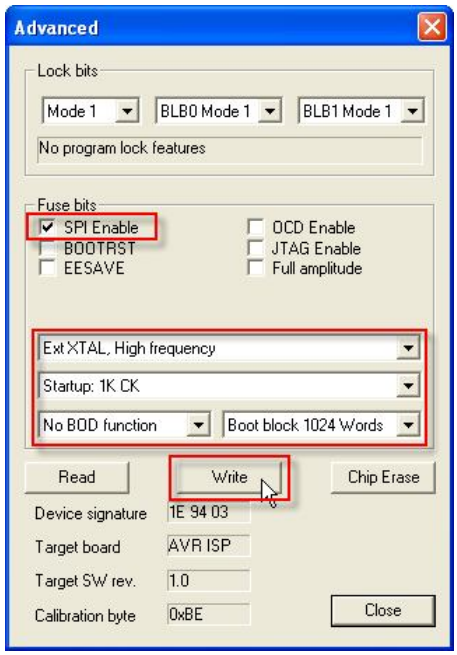
From the picture above, it displays the Parameter value and Fuse Bits value of Atmega16 that is connected with ET-AVRProg mini, these values are set from factory. The source of Signal CLOCK is **IntRCosc, Frequency 1 MHz** that uses RC Oscillator 1MHz internal Microcontroller. In this case, the circuit uses Crystal Frequency 8 MHz, so it needs to edit Fuse Bits.

14. Set new Fuse Bite according to the circuit that are actually used as shown in the picture below; in this case, it sets Signal CLOCK to be External Crystal.



NOTE: Always choose Fuse Bits as "SPI Enable". If user does not choose this value, it makes user can not program through ISP anymore. The method to edit the incorrect Fuse Bits is to use the high voltage Programmer such as ALL11, SUPERPRO. Moreover, it is also important part, user has to choose the source of Signal CLOCK according to the actually used circuit; for example, if the circuit uses Oscillator to be the Signal CLOCK Generator but user choses External Signal CLOCK (ExtRCosc), it makes user can not program through ISP anymore. In this case, it needs to edit by the high voltage Programmer or ET-AVRProg mini that is described at the end of this User's Manual. So, be very careful to choose and set this Fuse Bits, user can see more detailed information regarding Fuse Bits from Data Sheet of each number.

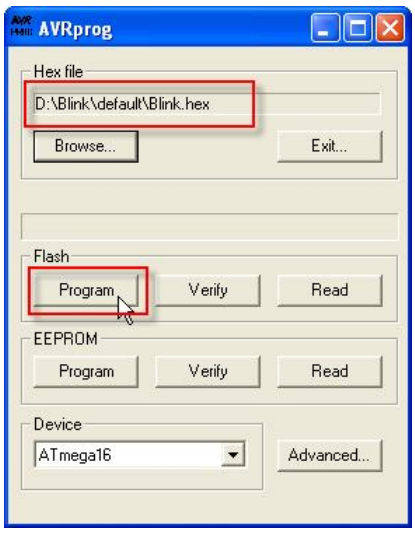
15. Click **Write** after set all values successfully to write Fuse Bits value into Microcontroller as shown in the picture below, and then click **Close** to exit from this window.



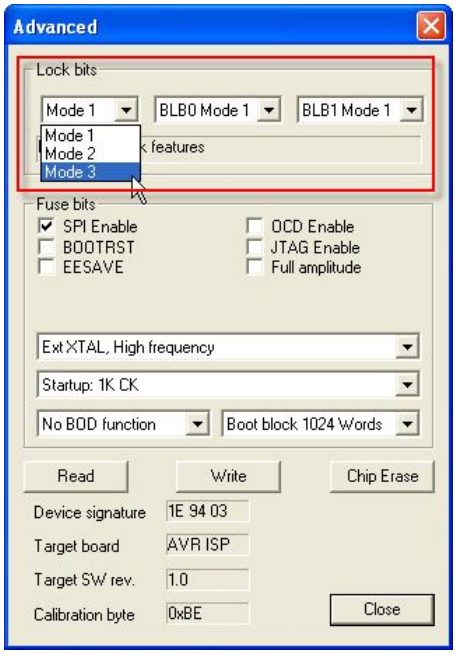
Advice: Write the Fuse Bits only one time, next time it is unnecessary to program this value again because it is still forever and is not deleted with the

part of Program memory; so, user has to program the Fuse Bite carefully.

16. Choose HEX File that is complied; normally, it is in **Folder default** of the project that we built. Click **Program.** When programmed successfully, the LED at Pin PB0 is blinking at 1 second speed.



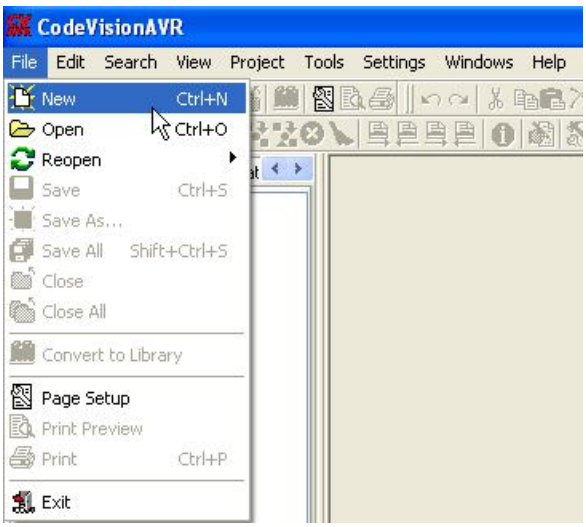
17. If user wants to protect data from reading (protect data from copying); click **Advance,** choose operating mode of **Lock Bits** as required and finally, click **Write.**



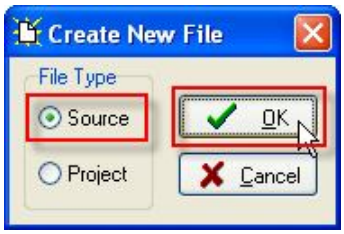
Application of ET-AVRProg mini with Program CodeVisionAVR

Program CodeVisionAVR is C Language Compiler of AVR Microcontroller that is widely popular because it is easy to use. However, this Compiler is not free. This example uses demo version of CodeVisionAVR that has limited size of Code program as 2 Kbyte. If user wants the full version or to try the program, please visit website: www.hpinfotech.com. This Program CodeVisionAVR is compatible with ET-AVRProg mini without opening other programs. The procedure of using this program is described below;

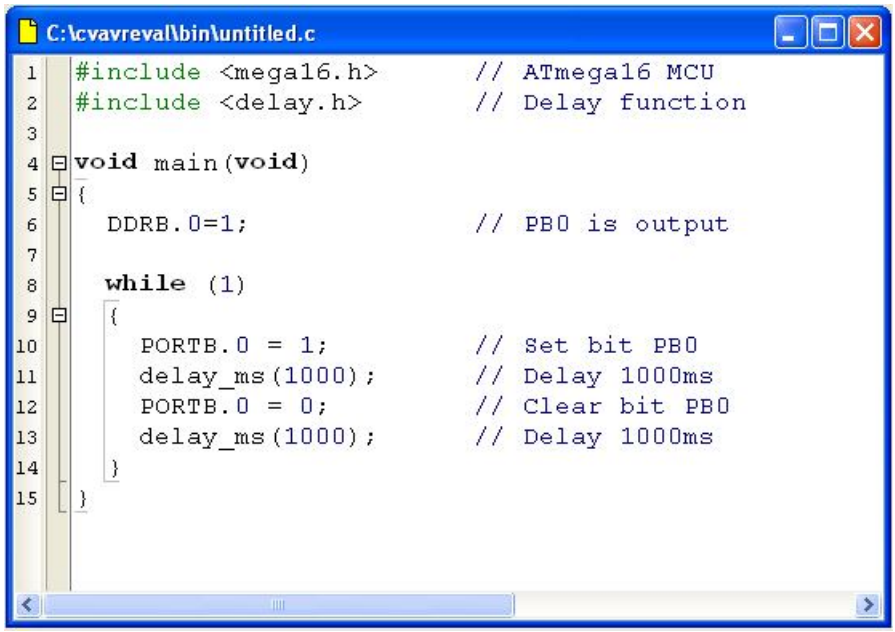
1. Open **Program CodeVisionAVR** and click Menu "**File → New**" as shown in the picture below.



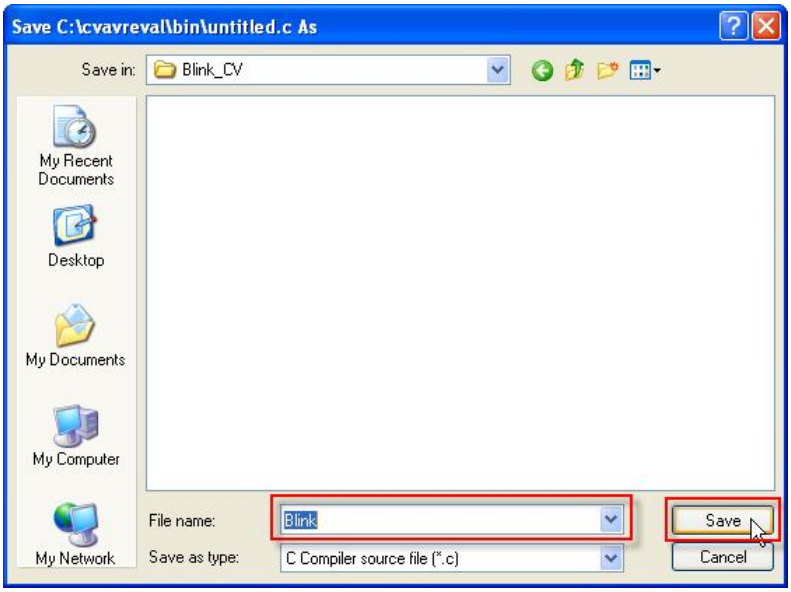
2. Choose **File Type** as **Source** to build new C Language File and then click **OK** as shown in the picture below.



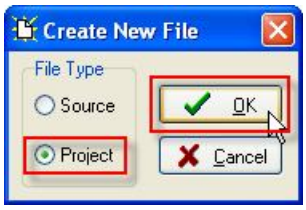
3. It displays window **Editor** for writing program, the example below is the program of blinking light at PB0.



4. Save the program that is written by C Language, choose Menu "**File → Save**", specify file name and then click **Save** as shown in the picture below.

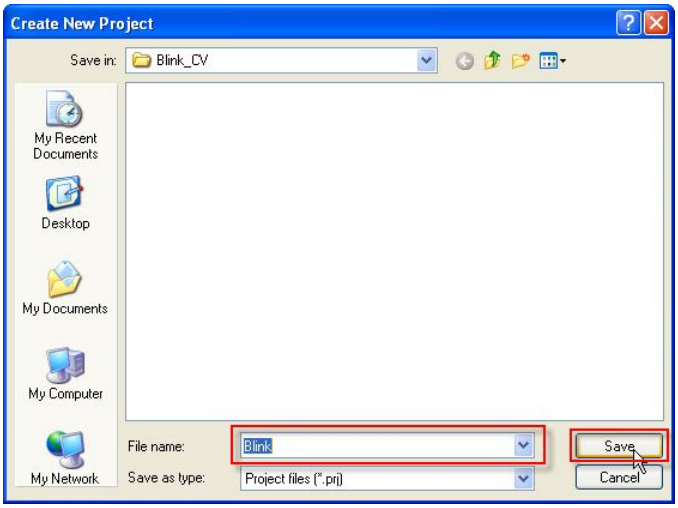


5. Go to Menu "**File → New**", choose **File Type** as **Project** to build new project and then click **OK** as shown in the picture below.

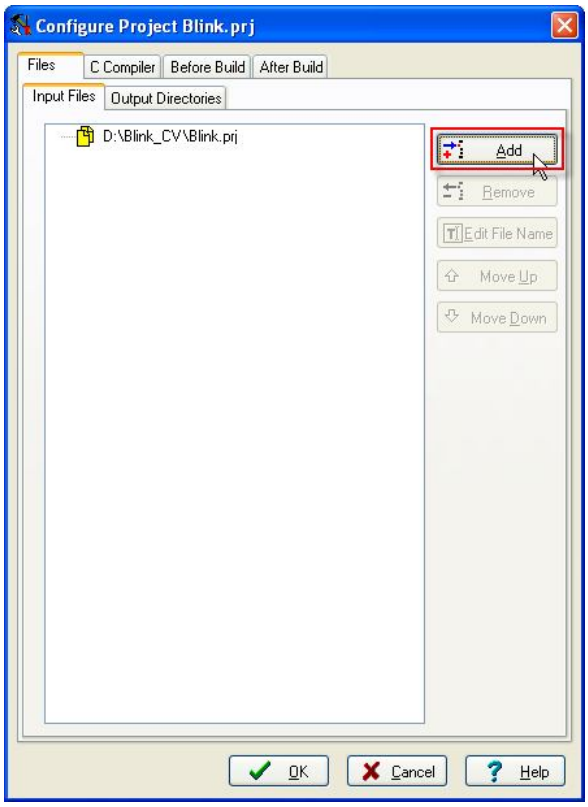


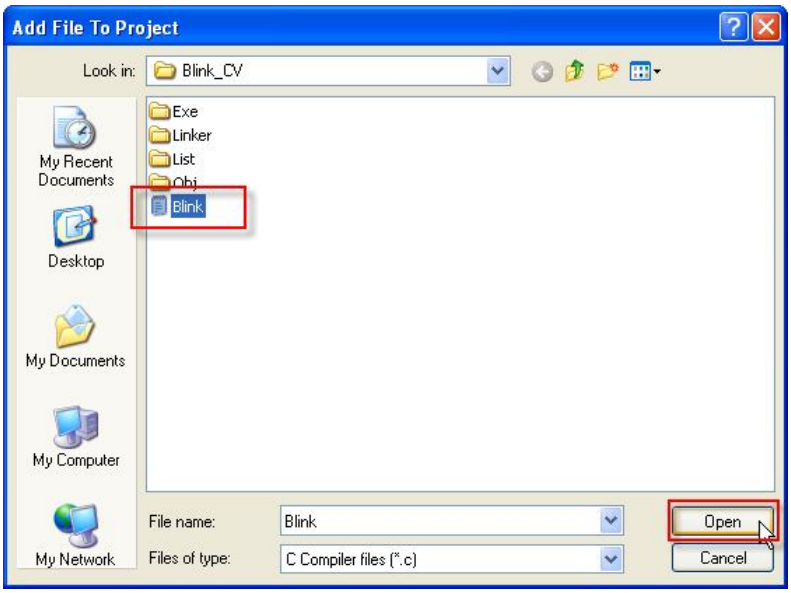
6. Click **No**, if you do not need any assistance to build the project (CodeWizard) as shown in the picture below.

7. Specify the project name as required and then click **Save** as shown in the picture below.

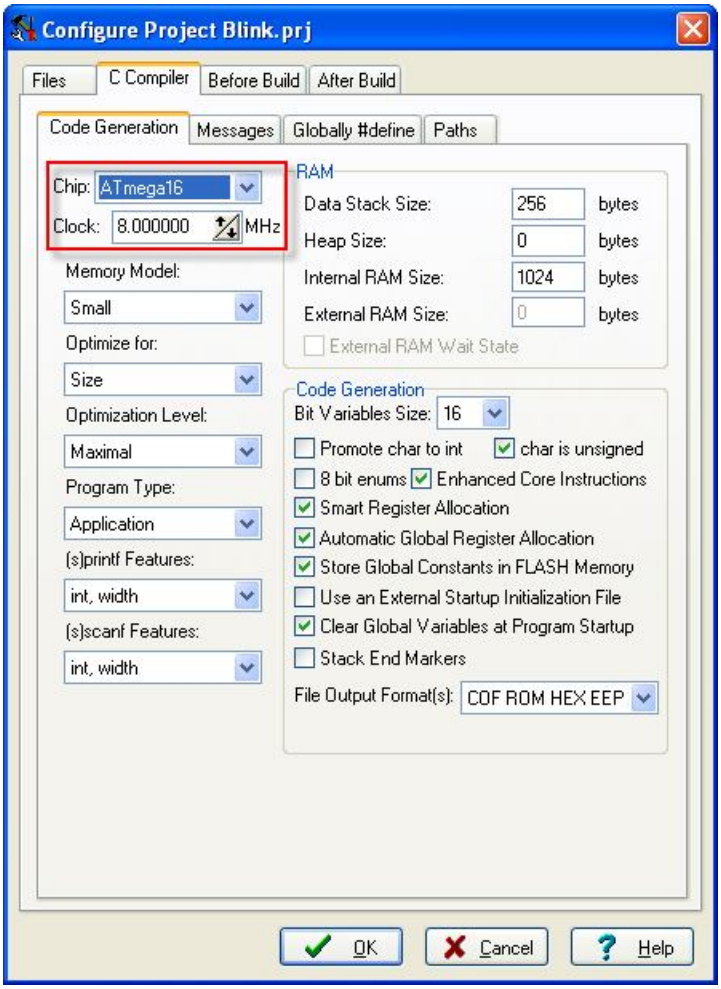


8. Add C Language File that is written previously into the project, click **Add** as shown in the picture below.

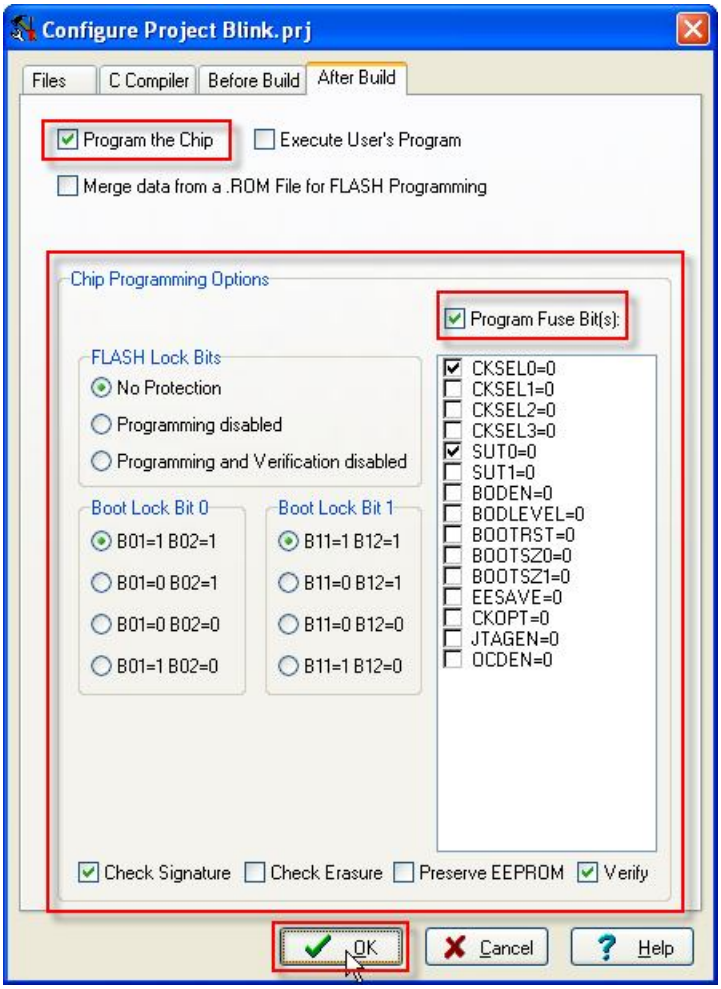




9. Choose **Tab Configuration Project** and go to **C Compiler;** choose **Chip** as **Atmega16** and **Clock** as **8.000000 MHz** as show in the picture below.

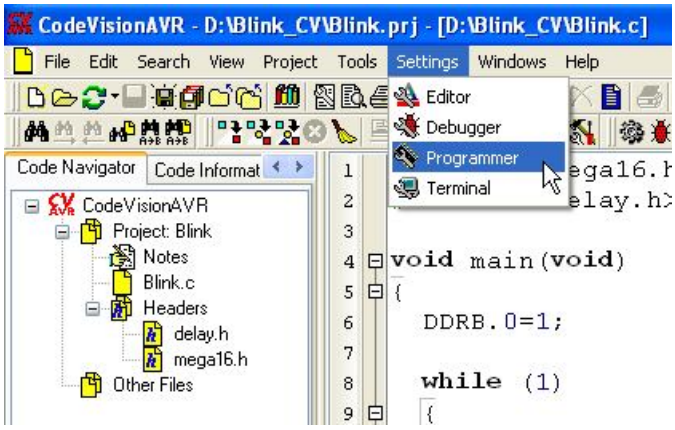


10. Go to **Tab After Build,** choose **Program the Chip** to program data into Microcontroller after compiled program successfully. For Fuse Bits ans Lock Bits, user can set them as required; in this case, user can set the Fuse Bits as shown in the picture below. However, if user does not want to program Fuse Bits, it is unnecessary to choose the **Option Program Fuse Bits.** When all values are set completely, click **OK.**

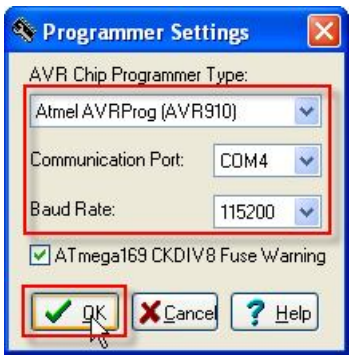


Be very careful if setting the Fuse Bits, please see more detailed information regarding Fuse Bits from Data Sheet of each number.

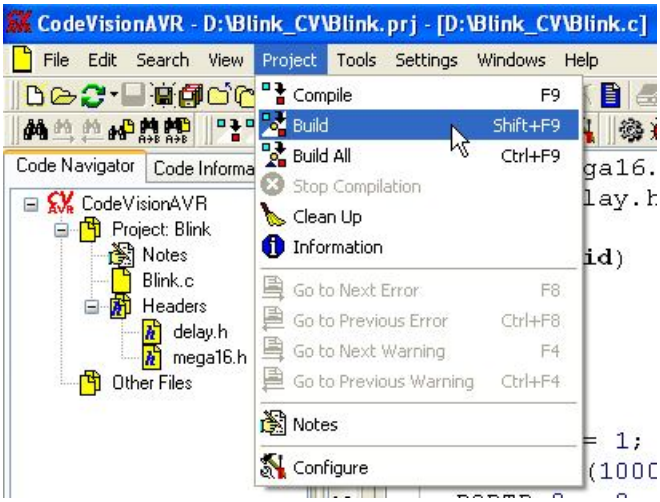
11. Choose the programmer type, click Menu "**Settings → Programmer**" as shown in the picture below.



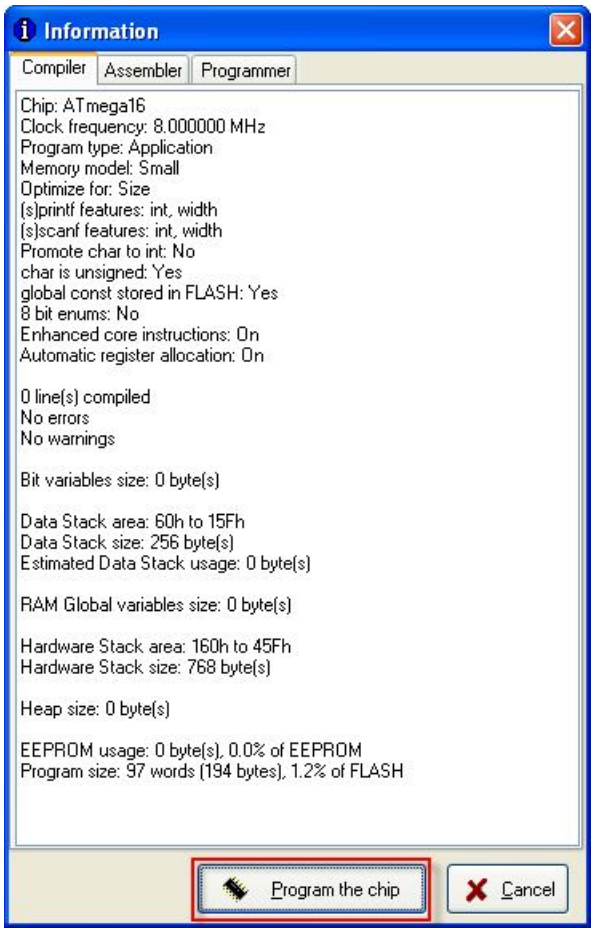
12. Choose **AVR Chip Programmer Type** as **Atmel AVRProg(AVR910)**, set **Communication Port** according to the actual installation in Driver; in this case, it is **COM4** and set **Baud Rate** as **115200** and finally, click **OK** as shown in the picture below.



13. Compile the written program, choose Menu "**Project → Build**" as shown in the picture below.



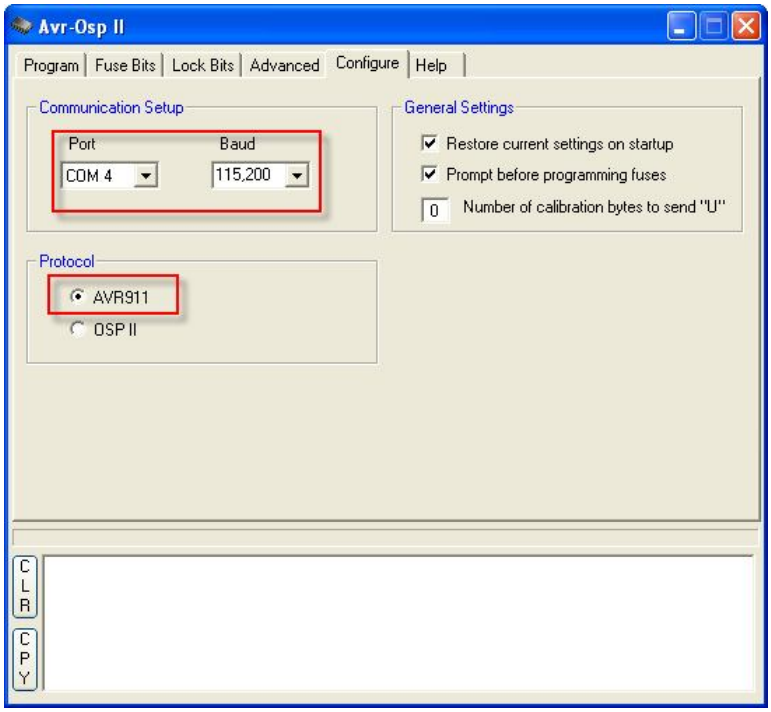
14. If the program is written correctly according to syntax, it displays message **"No errors"** as shown in the picture below. On the other hand, if there is error, it displays error message to warn user to edit and re-build program. When there is no any error, click **Program the chip** to program HEX File into Microcontroller as shown in the picture below.


Information
Compiler
Assembler
Programmer
Chip: ATmega16
Clock frequency: 8.000000 MHz
Program type: Application
Memory model: Small
Optimize for: Size
(s)printf features: int, width
(s)scanf features: int, width
Promote char to int: No
char is unsigned: Yes
global const stored in FLASH: Yes
8 bit enums: No
Enhanced core instructions: On
Automatic register allocation: On
0 line(s) compiled
No errors
No warnings
Bit variables size: 0 byte(s)
Data Stack area: 60h to 15Fh
Data Stack size: 256 byte(s)
Estimated Data Stack usage: 0 byte(s)
RAM Global variables size: 0 byte(s)
Hardware Stack area: 160h to 45Fh
Hardware Stack size: 768 byte(s)
Heap size: 0 byte(s)
EEPROM usage: 0 byte(s), 0.0% of EEPROM
Program size: 97 words (194 bytes), 1.2% of FLASH
Program the chip
Cancel

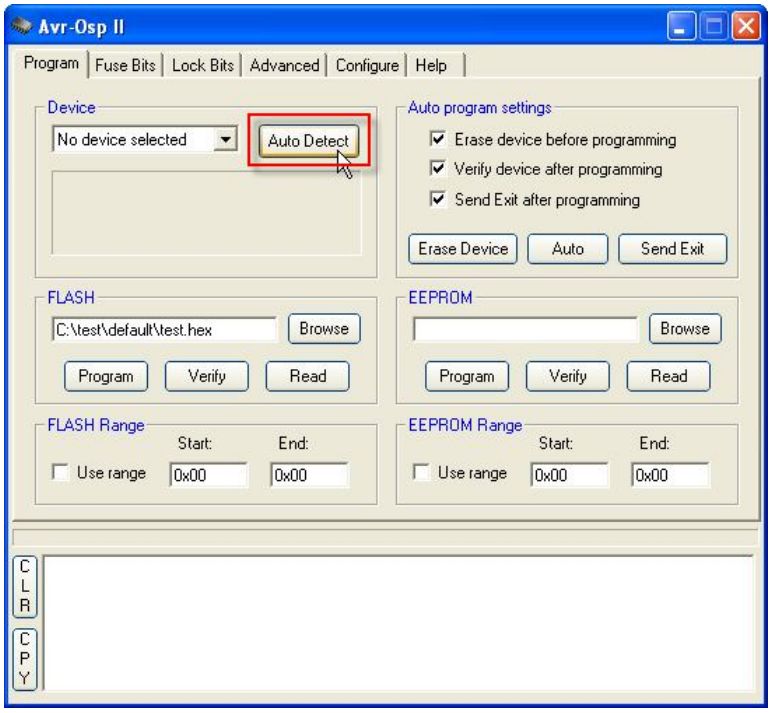
Application of ET-AVRProg mini with Program AvrOspll

Program AvrOspll is the program that is used to program HEX File into AVR Microcontroller. It is mini program size but it can support and program many numbers of AVR Microcontroller more than Program AvrProg. Moreover, it can see many COM Port more than COM4, so it is easier and more convenient to use. This program is developed by **Mike Henning** and user can download newer versions from website: http://www.esnips.com/web/AtmelAVR. The procedure to use this program is described below.

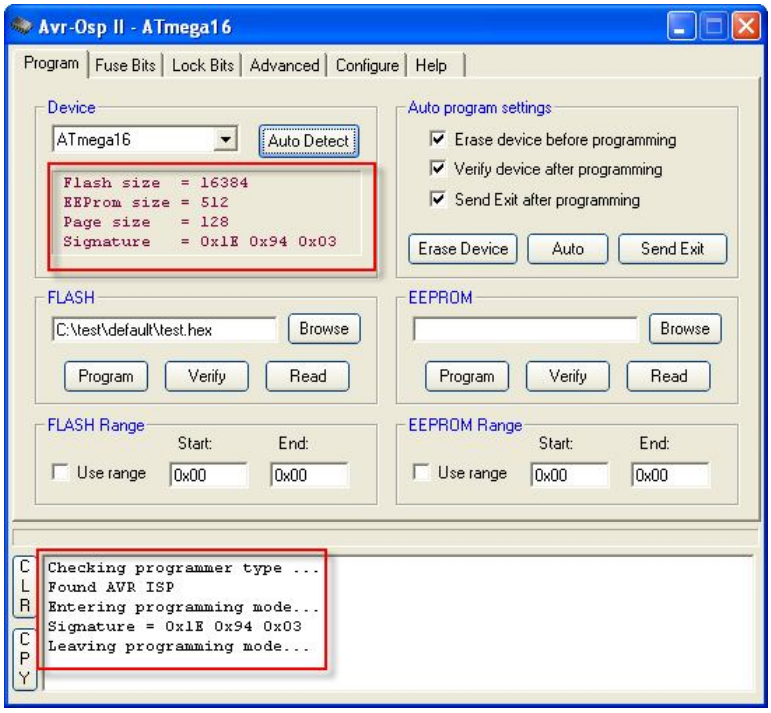
1. Open **Program AvrOspll**, choose **Tab Configuration**, and choose **Communication Setup**. Set **Port** as **COM4** or according to the actual installation in Driver, set **Baud Rate** as **115,200** and then set **Protocol** as **AVR911** as shown in the picture below.



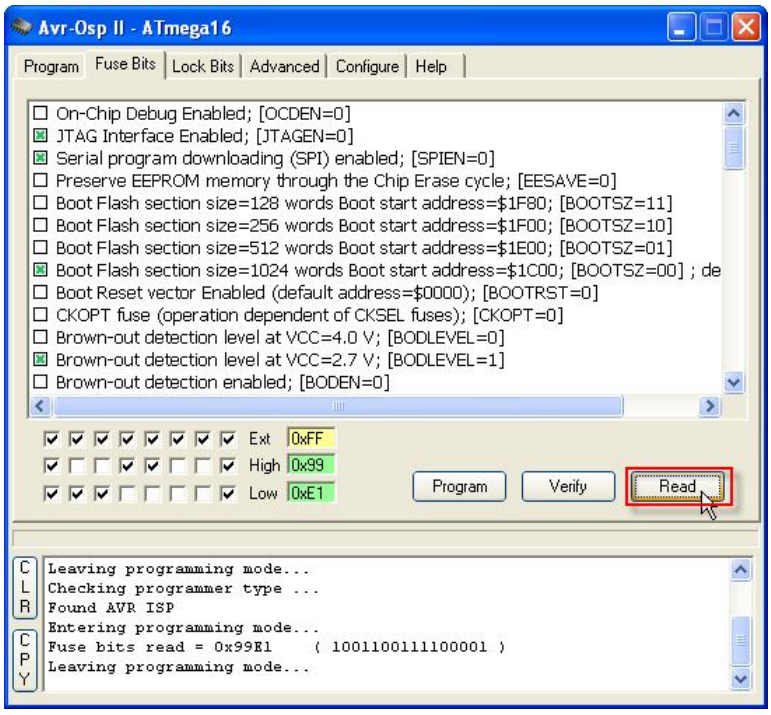
2. Choose **Tab Program**, click **Auto Detect** to search the AVR Microcontroller number automatically as shown in the picture below.



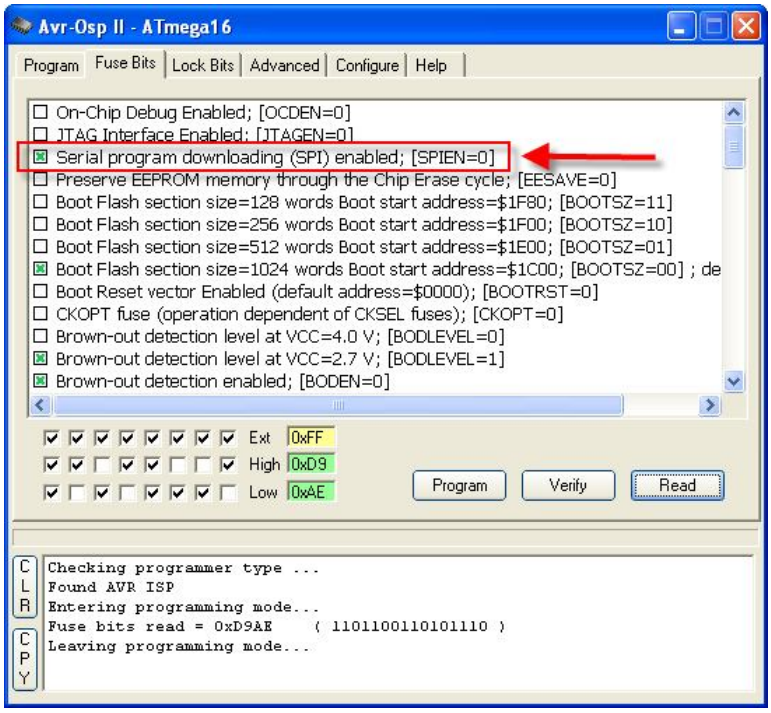
3. If everything is OK, program found AVR Microcontroller number as shown in the picture below; moreover, it displays the specific values. On the other hand, if after clicked **Auto Detect** but it did not find anything, please check whether the Cable ISP is connected with board correctly or not; or the connecting board maybe problem.

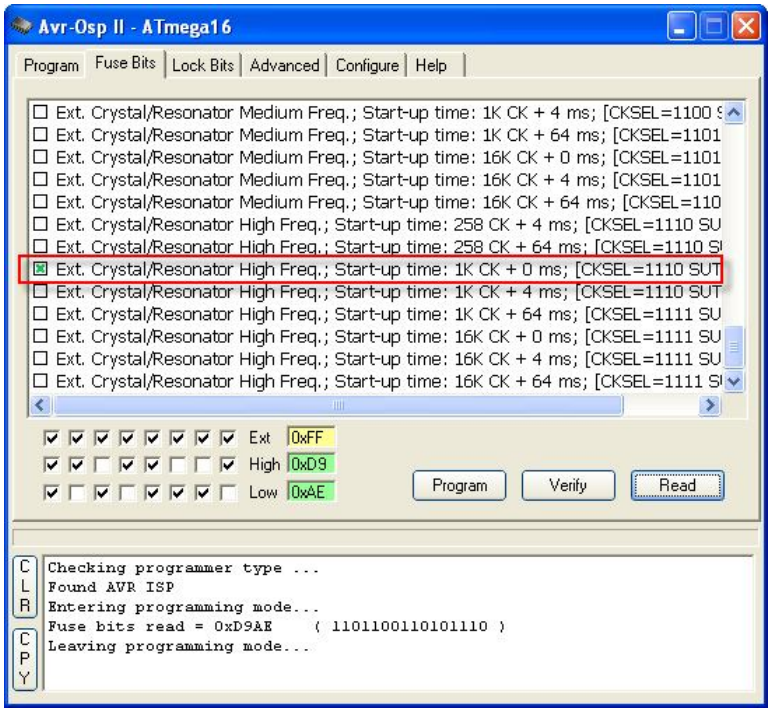


4. Choose **Tab Fuse Bits** and then click **Read** to read the standard Fuse Bits that is set from factory as shown in the picture below.


Avr-Osp II - ATmega16
Program
Fuse Bits
Lock Bits
Advanced
Configure
Help
On-Chip Debug Enabled; [OCDEN=0]
JTAG Interface Enabled; [JTAGEN=0]
Serial program downloading (SPI) enabled; [SPIEN=0]
Preserve EEPROM memory through the Chip Erase cycle; [EESAVE=0]
Boot Flash section size=128 words Boot start address=$1F80; [BOOTSZ=11]
Boot Flash section size=256 words Boot start address=$1F00; [BOOTSZ=10]
Boot Flash section size=512 words Boot start address=$1E00; [BOOTSZ=01]
Boot Flash section size=1024 words Boot start address=$1C00; [BOOTSZ=00] ; de
Boot Reset vector Enabled (default address=$0000); [BOOTRST=0]
CKOPT fuse (operation dependent of CKSEL fuses); [CKOPT=0]
Brown-out detection level at VCC=4.0 V; [BODLEVEL=0]
Brown-out detection level at VCC=2.7 V; [BODLEVEL=1]
Brown-out detection enabled; [BODEN=0]
Ext 0xFF
High 0x99
Low 0xE1
Program
Verify
Read
CLR
CPY
Leaving programming mode...
Checking programmer type ...
Found AVR ISP
Entering programming mode...
Fuse bits read = 0x99E1 (1001100111100001)
Leaving programming mode...

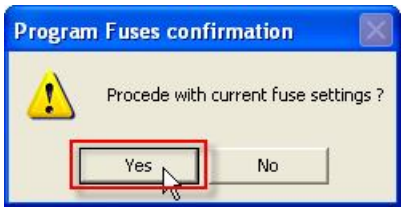
5. Set the Fuse Bits corresponding with the actually used circuit as shown in the picture below.



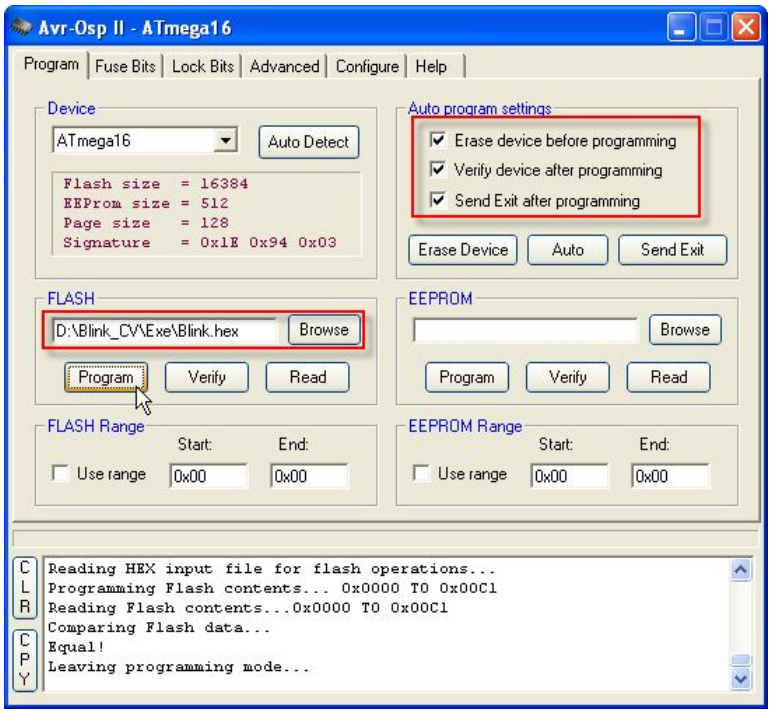

Avr-Osp II - ATmega16
Program
Fuse Bits
Lock Bits
Advanced
Configure
Help
Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 4 ms; [CKSEL=1100
Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 64 ms; [CKSEL=1101
Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 0 ms; [CKSEL=1101
Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 4 ms; [CKSEL=1101
Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 64 ms; [CKSEL=110
Ext. Crystal/Resonator High Freq.; Start-up time: 258 CK + 4 ms; [CKSEL=1110 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 258 CK + 64 ms; [CKSEL=1110 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 0 ms; [CKSEL=1110 SUT
Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 4 ms; [CKSEL=1110 SUT
Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 64 ms; [CKSEL=1111 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 0 ms; [CKSEL=1111 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 4 ms; [CKSEL=1111 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 64 ms; [CKSEL=1111 SU
Ext
0xFF
High
0xD9
Low
0xAE
Program
Verify
Read
CLR
CPY
Checking programmer type ...
Found AVR ISP
Entering programming mode...
Fuse bits read = 0xD9AE (1101100110101110)
Leaving programming mode...

NOTE, always Set Fuse Bit as "SPIEN=0". otherwise, user does not program through ISP anymore. The method to solve this problem is to edit by high voltage Programmer such as ALL11, SUPERPRO.Moreover, user needs to choose the source of Signal CLOCK corresponding with the actually used circuit; for example, if circuit uses Crystal to be the source of Signal CLOCK but user chooses External Signal CLOCK (ExtRCOsc), it makes user can not program through ISP next time. User needs to edit the source of Signal CLOCK by high voltage Programmer or ET-AVRProg mini as described at the end of this User's Manual. Please be very careful if setting this Fuse Bits, user can see more detailed information regarding the Fuse Bits from Data Sheet of each number.

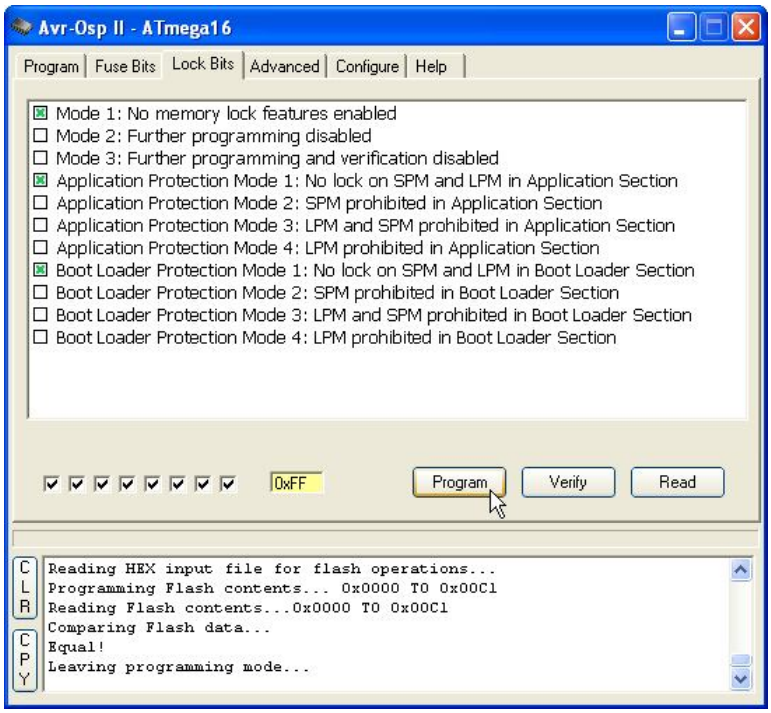
6. Click **Program** after set all values successfully to program the Fuse Bits. Then program asks if user wants to program the selected Fuse Bits, click **Yes** as shown in the picture below. **Program Fuse Bits only one time, it is unnecessary to program it next time**.



7. Choose **Auto program setting** as shown in the picture below and choose the preferred location to store the HEX File for programming and finally, click **Program.**



8. If user wants to protect data from reading (protect data from copying); choose **Tab Lock Bits** and choose the operating mode as required and then click **Program.**

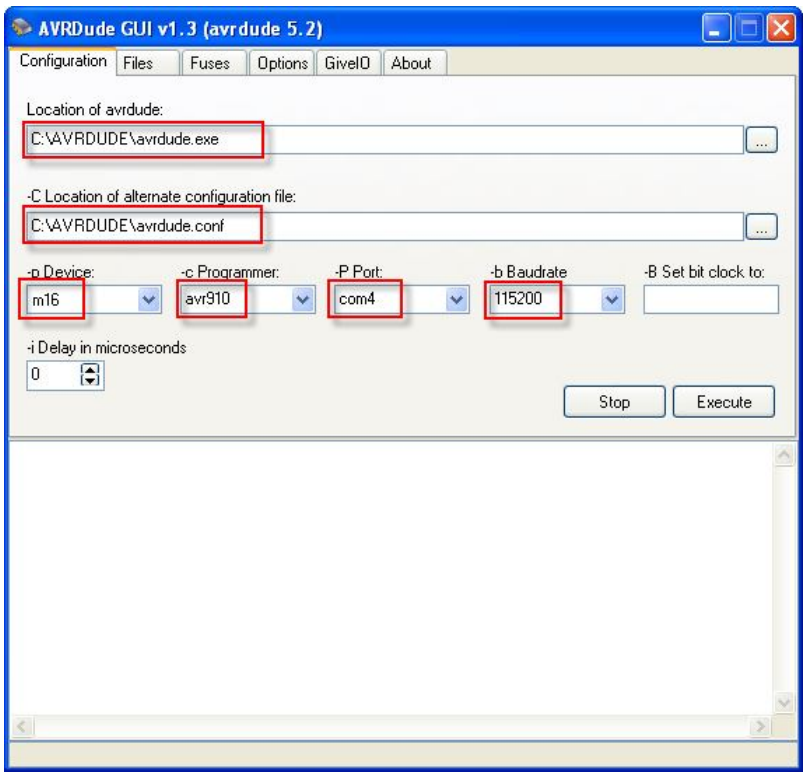

Avr-Osp II - ATmega16
Program
Fuse Bits
Lock Bits
Advanced
Configure
Help
Mode 1: No memory lock features enabled
Mode 2: Further programming disabled
Mode 3: Further programming and verification disabled
Application Protection Mode 1: No lock on SPM and LPM in Application Section
Application Protection Mode 2: SPM prohibited in Application Section
Application Protection Mode 3: LPM and SPM prohibited in Application Section
Application Protection Mode 4: LPM prohibited in Application Section
Boot Loader Protection Mode 1: No lock on SPM and LPM in Boot Loader Section
Boot Loader Protection Mode 2: SPM prohibited in Boot Loader Section
Boot Loader Protection Mode 3: LPM and SPM prohibited in Boot Loader Section
Boot Loader Protection Mode 4: LPM prohibited in Boot Loader Section
0xFF
Program
Verify
Read
CLR
CPY
Reading HEX input file for flash operations...
Programming Flash contents... 0x0000 TO 0x00C1
Reading Flash contents...0x0000 TO 0x00C1
Comparing Flash data...
Equal!
Leaving programming mode...

Application of ET-AVRProg mini with Program avrdude

Normally, **Program avrdude** has already been installed with Program WinAVR; on the other hand, if it has not been installed yet, can only install Program avrdude from this CD-ROM. However, Program avrdude is quite difficult because of Command Line Interface. In this case, we recommend user to use it with Program AVRDudeGUI that is specifically designed to use with **Program avrdude**. The procedure to use program is described as follows;

1. Copy Folder name "**AVRDUDE**" in Folder **Software** of CD-ROM into Drive C ("C:AVRDUDE\"). This folder consists of 3 important files; **avrdude.exe**, **avrdude.conf** and **AVRDudegui.exe**.

2. Run Program **AVRdudegui.exe**, choose **Tab Configuration** and then set values as follows;

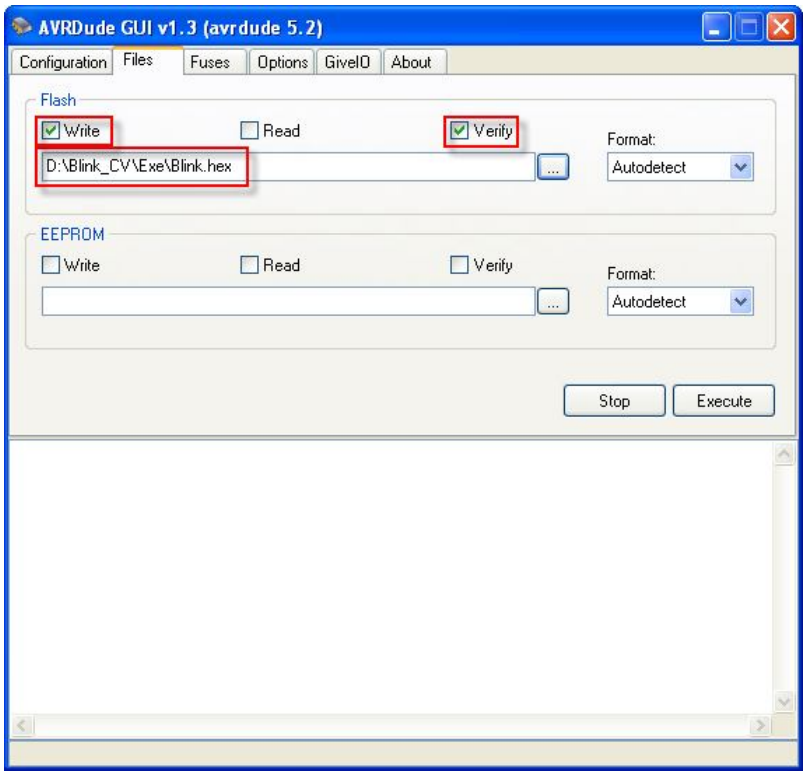


NOTE: If the COM Port number is greater than COM8, user needs to type the COM Port number into the blank - **P Port** by self such as COM9. However, if there are 2 digits, please add sign **"\\.\"** in front of the COM Port number; for example, if it is **COM13**, must type it as **"\\.\com13"**.

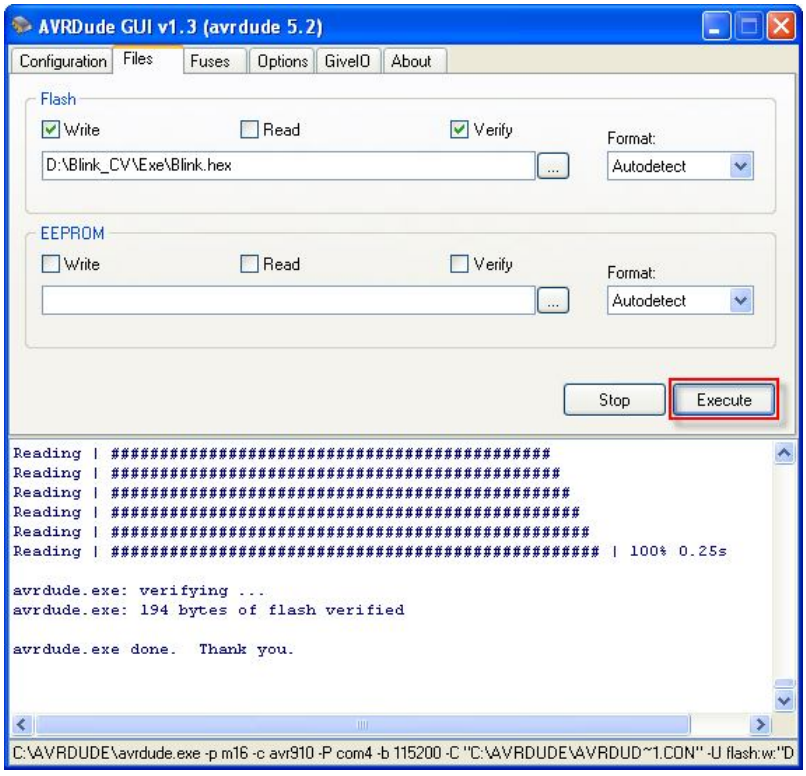
Set Configuration into Program AVRDudeGUI as follows;

- **Location of avrdude:** Choose name and location of File avrdude.exe that has already been installed in the step 1 that is "C:\AVRDUDE\avrdude.exe".
- **-C Location of alternate configuration file:** Choose name and location of File avrdude.conf that has already been installed in the step 1 that is "C:\AVRDUDE\avrdude.conf".
- **-p Device:** Choose it as **m16**.
- **-c Programmer:** Choose it as **avr910**.
- **-p Port:** Choose the COM Port number according to the actually installed Driver of USB (FTDI).
- **-b Baudrate:** Choose it as **115200**.

3. Go to **Tab Files**, set value in the part of **Flash**; choose **Write** and **Verify** and then specify the preferred HEX File name for programming as shown in the picture below.



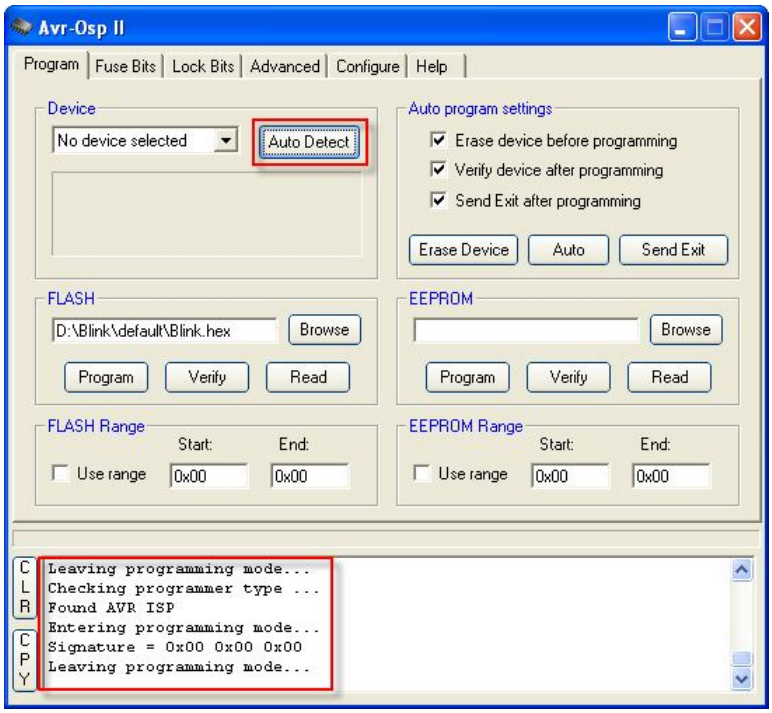
4. Choose **Execute** in **Tab Files** after set all values into program successfully, it makes Program avedude start programming HEX File into board instantly. Wait for a while until program is complete as shown in the picture below.



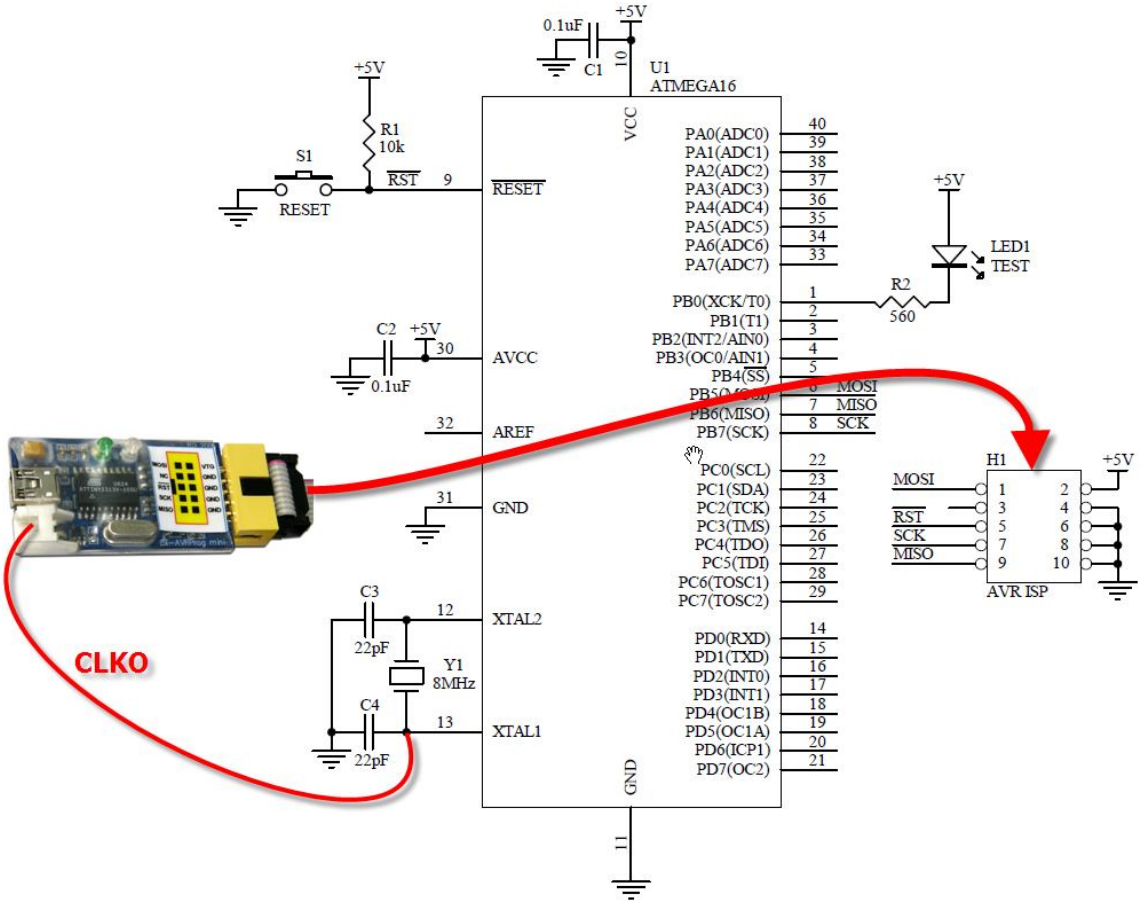
How to solve problem if choosing Fuse Bits of Signal CLOCK wrongly

The new beginner who uses AVR always programs Fuse Bits to choose Signal CLOCK incorrectly. For example, user chooses External CLOCK that is source of external Signal CLOCK but circuit is connected with Crystal, so the circuit can not operate and it can not load HEX File through ISP. The method to solve this problem is to **interface External Signal CLOCK with Pin XTAL1 of AVR**; next, edit the Fuse Bits correctly and then re-program. In this case, ET-AVRProg mini provides Signal CLOCK (CLK0) to edit the incorrect Fuse Bits as described below.

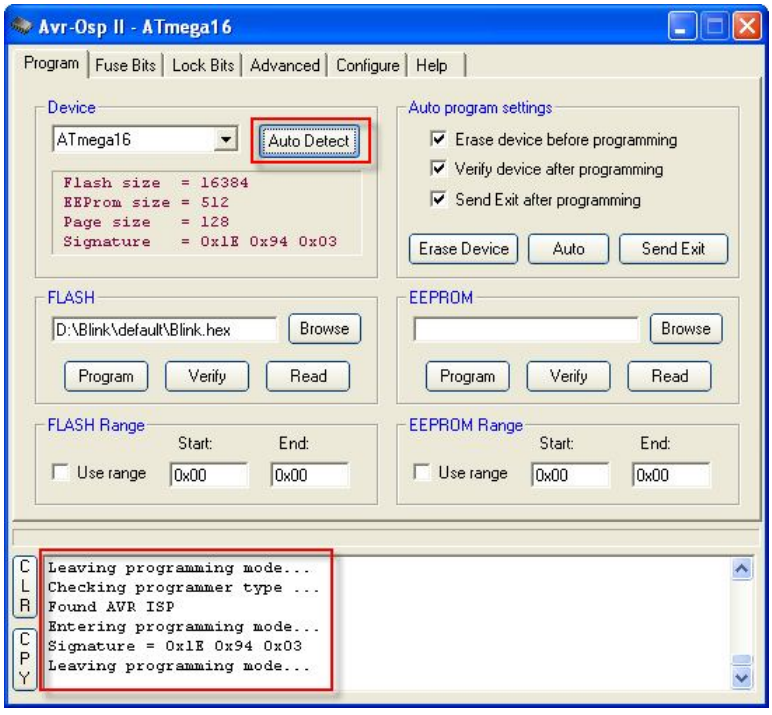
1. The feature of Fuse Bits that maybe programmed is; when ET-AVRProg mini is connected with board and click **Auto Detect**, it does not find any device as shown in the picture below.



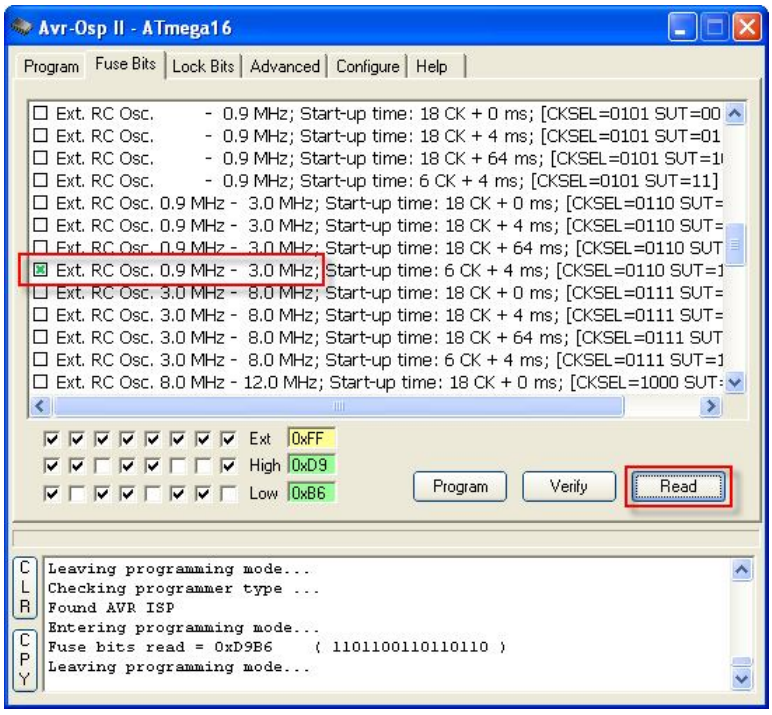
2. Interface **Cable CLKO** from ET-AVRProg to **Pin XTAL1** of AVR Microcontroller, it makes circuit operate by External Signal CLOCK as shown in the picture below.



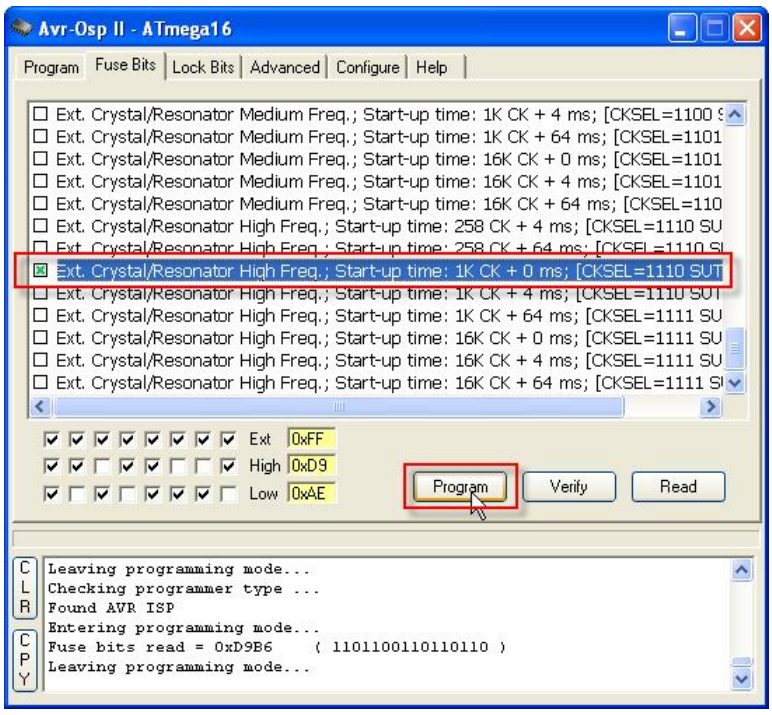
3. Click **Auto Detect** again; if actually chose Fuse Bits to be the source of External Signal CLOCK, it found device as shown in the picture below.



4. Choose **Tab Fuse Bits** and then click **Read** to read the Fuse Bits; in this case, the **Ext.RC Osc.** is chosen that is the External Signal CLOCK.


Avr-Osp II - ATmega16
Program
Fuse Bits
Lock Bits
Advanced
Configure
Help
Ext. RC Osc. - 0.9 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=0101 SUT=00
Ext. RC Osc. - 0.9 MHz; Start-up time: 18 CK + 4 ms; [CKSEL=0101 SUT=01
Ext. RC Osc. - 0.9 MHz; Start-up time: 18 CK + 64 ms; [CKSEL=0101 SUT=1
Ext. RC Osc. - 0.9 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0101 SUT=11]
Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=0110 SUT=
Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 18 CK + 4 ms; [CKSEL=0110 SUT=
Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 18 CK + 64 ms; [CKSEL=0110 SUT
Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0110 SUT=1
Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=0111 SUT=
Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 18 CK + 4 ms; [CKSEL=0111 SUT=
Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 18 CK + 64 ms; [CKSEL=0111 SUT
Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0111 SUT=1
Ext. RC Osc. 8.0 MHz - 12.0 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=1000 SUT=
Ext 0xFF
High 0xD9
Low 0xB6
Program
Verify
Read
CLR
CPY
Leaving programming mode...
Checking programmer type ...
Found AVR ISP
Entering programming mode...
Fuse bits read = 0xD9B6 (1101100110110110)
Leaving programming mode...

5. Choose new Fuse Bits to be **Ext. Crytal/Resonator** according to the actually used circuit and then click **Program** as shown in the picture below.


Avr-Osp II - ATmega16
Program
Fuse Bits
Lock Bits
Advanced
Configure
Help
Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 4 ms; [CKSEL=1100
Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 64 ms; [CKSEL=1101
Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 0 ms; [CKSEL=1101
Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 4 ms; [CKSEL=1101
Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 64 ms; [CKSEL=110
Ext. Crystal/Resonator High Freq.; Start-up time: 258 CK + 4 ms; [CKSEL=1110 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 0 ms; [CKSEL=1110 SUT
Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 64 ms; [CKSEL=1111 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 0 ms; [CKSEL=1111 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 4 ms; [CKSEL=1111 SU
Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 64 ms; [CKSEL=1111 SU
Ext 0xFF
High 0xD9
Low 0xAE
Program
Verify
Read
CLR
CPY
Leaving programming mode...
Checking programmer type ...
Found AVR ISP
Entering programming mode...
Fuse bits read = 0xD9B6 (1101100110110110)
Leaving programming mode...

6.Remove Signal **CLKO** from **Pin XTAL1** of AVR and then click **Auto Detec**t, it found Device as usual.

NOTE: There are 2 cases that are unable to edit the Fuse Bits. Firstly, it chooses the Fuse Bits to close operating mode of ISP (SPIEN=0); and secondly, it closes operation of Pin RESET to use as IO. Both cases must use high voltage Programmer to edit the Fuse Bits only.